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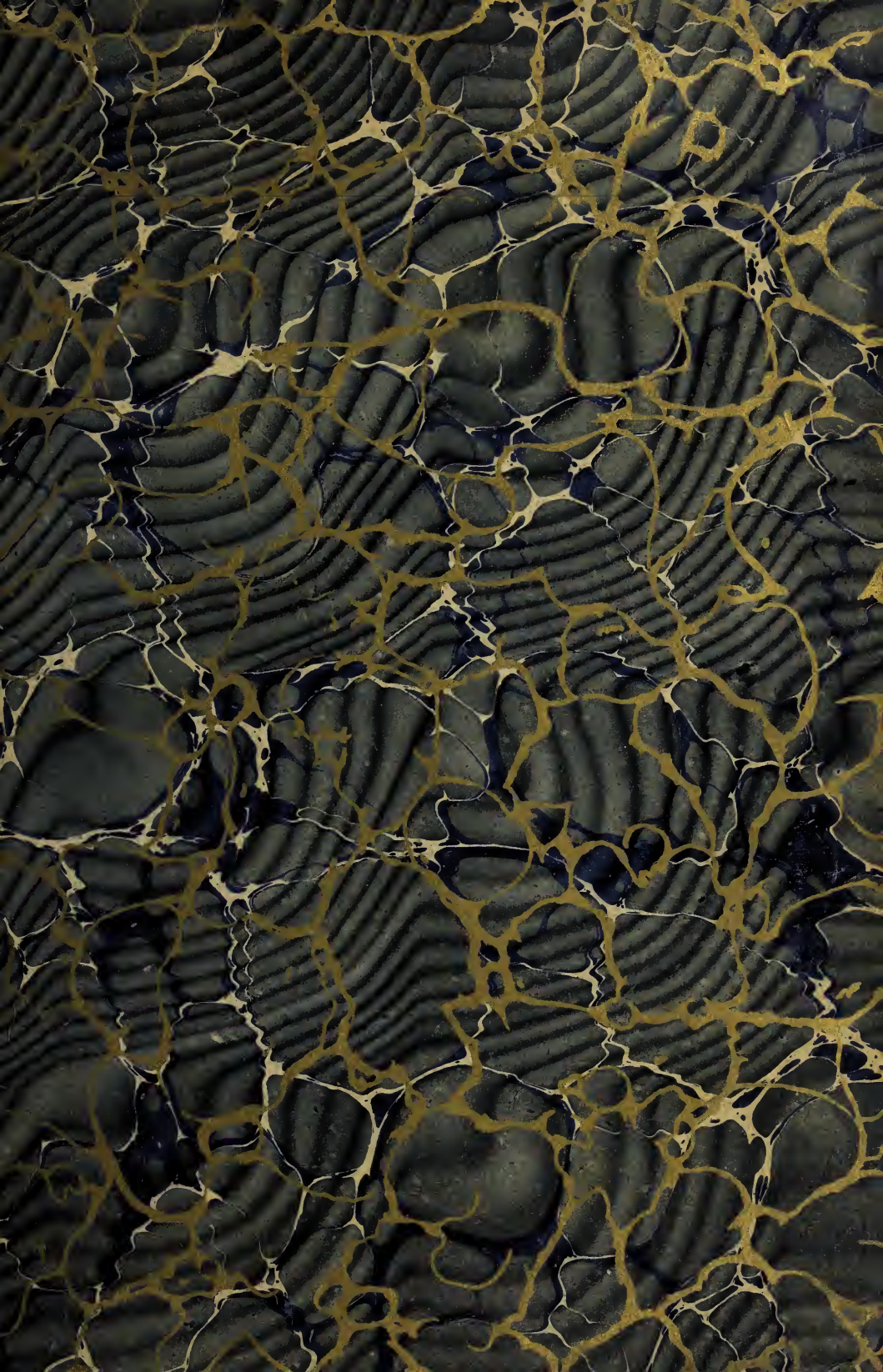
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ARNOLD ARBORETUM
HARVARD UNIVERSITYBULLETIN
OF
POPULAR INFORMATION

JAMAICA PLAIN, MASS.

MAY 4, 1918

Effects of the Severe Winter. The winter of 1917-18 has been one of the severest in New England of which there is any record. In December when the ground was without a covering of snow the thermometer did not rise here from above zero for nearly a week with a minimum of 17° below. There was little snow at any time during the winter, and the ground, which froze to a depth of from five to seven feet, was not clear of frost until after the first of April. Abundant rains late in the summer and in the early autumn, and the fact that the cold has been continuous through the winter, without periods of warm weather, which in this region often excite dangerous vegetative activity, have enabled many plants to survive the extreme cold which under less favorable conditions would probably have destroyed them. Still it seems safe to predict that any tree or shrub which has lived here through the past winter will be able to resist successfully a Massachusetts winter. The condition of the plants in the Arboretum at this time is of general interest therefore as an indication of the trees and shrubs of recent introduction which can be successfully grown in this climate. It must, however, be remembered that local conditions, that is conditions of soil, position, moisture and dryness influence the hardiness of plants, and that a tree which succeeds in the Arboretum might not be hardy in another garden in the same general region.

The injuries to the Arboretum collections caused by the winter have not on the whole been as great as we had every reason to fear three months ago. The Conifers which have been killed are the glaucous-leaved Mt. Atlas Cedar (*Cedrus atlantica glauca*) which has been kept alive here for several years in a protected position; young plants of

the Spanish Fir (*Abies Pinsapo*) which has been killed before in the Arboretum; *Abies magnifica* of the California Sierra Nevada; *Abies cephalonica* var. *appolinis* from the mountains of Greece; *Picea Sargentiana*, one of the new Spruces from western China, and nearly every plant in a large collection of the short-leaved Pine of the eastern United States (*Pinus echinata*). These Pines were raised at the Arboretum twenty years ago from seeds gathered on Staten Island, New York, the northern limit of the range of this tree, and appeared to be perfectly hardy until this year. On several conifers the buds are uninjured and are beginning to swell, although the leaves have been more or less browned by the cold and will soon fall. Conifers injured in this way will probably recover, although their growth for the year will be necessarily checked. Among the trees with injured leaves and uninjured buds are the Cedars of Lebanon from the Anti-Taurus in Asia Minor which have been growing in the Arboretum for sixteen years without protection, and which it was hoped would be able to support the worst conditions New England winters could offer. Other conifers with injured leaves are the Sugar Pine (*Pinus Lambertiana*) from the Sierra Nevada of California, the Mexican White Pine (*Pinus Ayacahuite*), the Chinese Hemlock (*Tsuga chinensis*) which has lost most of its top, and *Abies cephalonica* from the islands of Greece. One or two specimens of this tree will probably not recover. The leaves of the California Incense Cedar (*Libocedrus decurrens*), of *Abies grandis*, of *Abies amabilis* and of the Hemlock of the northwest coast (*Tsuga heterophylla*) are slightly injured. The native White Cedar (*Chamaecyparis thyoides*) is badly hurt and some of the plants will probably die. The Red Spruce (*Picea rubra*) from northern New England has suffered badly, as have the plants of the upright form of *Juniperus communis* from central Massachusetts. The leaves of *Abies amabilis*, too, from the Cascade Mountains of Oregon are slightly browned, as are those of several plants of the Japanese *Abies sachalinense*. On a few of the plants of the Chinese White Pine (*Pinus Armandi*), of the Japanese *Pinus densiflora* and *P. Thunbergii*, and of the Chinese *Pinus sinensis* var. *yunnanensis* and var. *denudata* the leaves are also brown. There is no reason, however, to doubt that these will all recover. It is interesting that, with the exception of four exotic conifers, three of which have been kept alive in the Arboretum with much difficulty and have now perished, the most serious damage of the winter to conifers has been to four native species, *Picea rubra*, *Pinus echinata*, *Chamaecyparis thyoides* and *Juniperus communis*. All the new Spruces and Firs from western China, with the exception of *Picea Sargentiana*, are uninjured, as are practically all the Chinese Pines. Uninjured, too, are the Carolina Hemlock (*Tsuga caroliniana*) the western Arbor Vitae (*Thuja plicata*), and the Spanish Pine (*Pinus nigra tenuifolia*) which, judging by the climate of the regions where these trees grow naturally might well have suffered from the cold of the past winter.

Of the new trees with deciduous leaves introduced by the Arboretum from China the following are uninjured: all the Oaks, Elms, Birches, Nettle-trees, Beeches, many of the Cherries, the Pears and Apples,

Davidia, *Eucommia*, and *Ehretia acuminata*. As space permits reports on the losses caused by the winter in other groups of plants will appear in later issues of these bulletins.

Early-flowering Shrubs. Fortunately frost has not injured this spring the buds of many of the trees and shrubs which open their flowers in April and several of these have been unusually fine this year and have remained in good condition for a longer time than usual. After some of the Willows the earliest shrubs in the Arboretum to bloom this year were the Buffalo Berry (*Shepherdia argentea*) and the Leatherwood (*Dirca palustris*). The latter began to bloom on the 7th of April, nearly three weeks earlier than last year, and unfaded flowers are still to be seen on this eastern American shrub. A large group of these plants on the right-hand side of the Bussey Hill Road is one of the interesting early spring features of the Arboretum. The flower-buds of garden Peach-trees have been generally killed in Massachusetts by the cold of the winter, but the wild Peach-tree of northern China (*Prunus Davidiana*) opened its uninjured flower-buds in the Arboretum on the 15th of April. This is an attractive small tree with erect branches and lustrous red-brown bark. As a flowering tree in this climate, however, it is hardly worth a place in gardens for the flowers open so early that they are ruined by late frosts. The fruit is small and of no value, but pomologists are interested in this tree as a stock on which to work the common Peach-tree for it is hardy north of the region where Peaches flourish.

Early-flowering Rhododendrons. The bright rose-colored flowers of the Siberian and Mongolian *Rhododendron dahuricum* opened this year as early as the 10th of April and remained in good condition until the end of the month. It is a small shrub with dark green leaves which in this climate remain on the branches until late in the winter, and it would be a good garden plant here if the flowers were not so often ruined by late frosts. There is a variety *sempervirens* with more persistent leaves and darker-colored flowers which has bloomed this year with the species on the upper side of Azalea Path. In the Rhododendron Collection at the base of Hemlock Hill a group of a hybrid of *R. dahuricum* with the Himalayan *R. ciliatum*, known as *R. praecox*, Early Gem, is now covered with flowers. This is a perfectly hardy plant but, unfortunately, blooms too early in this climate and the flowers are generally injured by frost. More valuable here is the north China *R. mucronulatum* which this year began to flower a little later than *R. dahuricum* and is still covered with its pale rose-colored flowers. It is a tall, hardy, deciduous-leaved shrub which has flowered freely in the Arboretum every spring for the last twenty years. The flowers open before the leaves appear and are not injured by spring frosts. This year they have been in good condition for nearly three weeks. In this climate this is the most valuable of the Rhododendrons and Azaleas which bloom in April.

Early-flowering Magnolias. The flower-buds and the flowers of the Japanese *Magnolia stellata*, *M. Kobus* and its variety *borealis*, and of

the Chinese *M. denudata*, more often called *M. conspicua*, and its hybrids, have been uninjured by winter cold or April frost and are blooming well this year with the exception of *M. Kobus* and its variety which, never very free with their flowers, are less prolific than usual this year. The plants of the Japanese *M. salicifolia*, which has never succeeded in the Arboretum by which it was first introduced into cultivation, appear to have been killed outright this winter.

Corylopsis. All the species of this genus of shrubs of the Witch Hazel Family cultivated in the Arboretum have survived the winter with little or no loss of wood, but the flower-buds of the Chinese *C. Veitchiana* and *C. Willmottae*, and of the Japanese *C. pauciflora* and *C. spicata* have been killed by the cold, and the only species which has flowered is *C. Gotoana* of the elevated region of central Japan. This is evidently the hardiest of the plants of this genus, and as it has now flowered in the Arboretum every spring for several years there is good reason to hope that we have here an important shrub for the decoration of northern gardens. The flowers are produced in drooping spikes and open before the leaves appear, as in the other species, and are of a delicate canary-yellow color and pleasantly fragrant. The best specimen in the Arboretum can be seen on the left-hand side of Hickory Path near Centre Street.

Prinsepia sinensis is a tall Chinese shrub with stem and branches armed with many spines, bright green leaves which unfold as early as those of any other plant in the Arboretum, and bright yellow flowers about two-thirds of an inch in diameter in few-flowered axillary clusters. The large specimen on the right-hand side of Hickory Path near Centre Street is now covered with flowers and nearly fully grown leaves. There can be no question of the hardiness of this shrub or of its ability to flower under any climatic conditions it may have to meet in Massachusetts. It will perhaps be found that it will prove to be as good a hedge plant as can be used in this part of the country. Unfortunately the Arboretum plants have not yet produced more than an occasional seed, and as *Prinsepia* is not easy to increase from cuttings it has remained exceedingly rare.

Maddenia hypoleuca. This interesting shrub which flowered last year in the Arboretum for the first time in America and was described in the Bulletin of May 8th, came through the winter without injury on the southern slope of Bussey Hill and was in full bloom this year on the 18th of April. It is related to the Rum or Choke Cherries, but the flowers are without petals and are not conspicuous.

Cherries and Plums. This is a good season for many of these plants. Among the Cherries *Prunus tomentosa* and the single-flowered form of *P. triloba* from northern China are already in bloom. The trees of the Sargent Cherry (*Prunus serrulata* var. *sachalinensis*) have never been more covered with their pink and rose-colored flowers, and the Japanese Spring Cherry (*P. subhirtella*) which has been described as the the most floriferous and perhaps the most delightful of the Japanese Cherries, is just opening its countless flower-buds.

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JAMAICA PLAIN, MASS.

MAY 9, 1918

Effects of the severe winter. Most of the Taxads which have been grown successfully in the Arboretum have suffered from the cold of the winter. All the forms of the Japanese *Taxus cuspidata*, however, are now as green and fresh as they were in October. As the years pass the confidence in the value of this plant increases and it has never been as great as it is this spring. Among all the plants which Japan has contributed to the gardens of the eastern United States no other is so generally valuable. Fortunately American nurserymen are at last beginning to realize that this Yew has some commercial value, and it will soon be within the reach of everyone who has a garden or wants to plant the best possible evergreen hedge for New England. The form of this Yew (var. *chinensis*) introduced by Wilson from western China is less hardy than the Japanese plant. In a collection of young plants of the Chinese form, in as protected a position as could be found in the Arboretum, some are slightly injured and others are dead. It is not probable that this fine tree, therefore, will ever become established in Massachusetts. On all the forms of the European Yew (*Taxus baccata*) there are dead leaves and dead or injured branches. All the plants of *T. baccata erecta* have been killed, and there are a few dead branches even on *T. baccata repandens*, the plant with wide-spreading, semiprostrate stems which has lived in this climate for several years without injury and has been considered here the hardiest and most desirable of all the forms of the European Yew for New England. Plants of the Canadian Yew (*T. canadensis*), the so-called Ground Hemlock of northern woods, planted in the shade or in full exposure to the sun, have been badly disfigured as the tips of most of the branches and all the upper leaves have been killed. The leaves on upper branches of the Japanese *Torreya mucifera* are dry and begin-

ning to turn brown, but the buds appear to be uninjured and the plants may recover. It has not suffered here before and for the last two or three years has been producing fruit in the Arboretum. The California Torrey (*T. californica*), which has been nursed along in a sheltered position for years and has suffered more or less every winter, appears to have at last entirely succumbed. Young plants in a sheltered position of the Japanese *Cephalotaxus drupacea* are little injured but the handsomer *C. Fortunei* from western China has suffered and it is doubtful if this fine tree will live through many years in this climate.

Broad-leaved Evergreens. As it was natural to expect, the plants of this class have been more injured by the winter than any others, for with few exceptions they cannot be successfully grown in this climate under even the most favorable conditions. *Ilex opaca*, which has grown well in the Arboretum for many years where it has been the only broad-leaved evergreen tree which has lived here, has suffered seriously. Nearly all the leaves have been killed and some of the plants appear to be dead. The large plants of the Japanese *Ilex crenata* on Azalea Path, which were raised from seed at the Arboretum twenty-five years ago, have been so badly injured that it is doubtful if they can recover. The Inkberry (*Ilex glabra*), a common shrub in the region of the coast from New Hampshire to Texas, has lost the ends of many branches and most of its upper leaves. For more than twenty years there have been splendid specimens of this beautiful shrub in the Arboretum where it has never been injured before and has been considered one of the best evergreen shrubs which can be grown in this climate. Plants of an evergreen Holly (*Ilex pedunculata*), introduced by Wilson from western China and planted on Hickory Path near Centre Street, have, however, not been injured by the winter. This is a handsome tree with long-stalked red fruits, and is distributed through Japan and western China. Judging by our experience here with other evergreen Hollies, the chances that it will ever grow to maturity are not very good. For the first time in the Arboretum there are brown leaves and dead branches and flower-buds on some of the Laurels (*Kalmia latifolia*). The damage is not serious but it is interesting as showing how the hardiest native plants, even when planted in exceptionally good positions, may be injured by a winter like the last which has killed also the ends of the branches of such common New England evergreen shrubs as the little Sheep Laurel (*Kalmia angustifolia*) and the Leather Leaf (*Chamaedaphne calyculata*). The leaves of *Leucothoe Catesbaei* are badly browned even on plants in moist shady positions which this species prefers. A native of the southern Appalachian forests, it has been considered one of the hardiest and most satisfactory broad-leaved evergreens which could be planted in this climate. *Leucothoe axillaris* has also lost its leaves but will probably recover. *Pieris* or *Andromeda floribunda* is uninjured and is now covered with flowers, and its condition confirms the belief here that this is one of the hardiest, handsomest and most desirable broad-leaved evergreen shrubs which can be grown in this part of the country. Its Japanese relative, *Pierus japonica*, seems equally hardy, but its larger and more beautiful flowers open earlier and are often injured by spring frosts.

Evergreen Barberries. The four Chinese evergreen Barberries, *Berberis Julianae*, *B. Sargentiana*, *B. verruculosa* and *B. Gagnepainii*, from which so much has been expected, have suffered seriously. *B. Julianae* and *B. Sargentiana* will probably not recover, and there is little hope that much garden beauty will ever be obtained in this region from evergreen Barberries, for all the Mahonias which have been grown here are in unusually bad condition this spring, with the exception of the dwarf *Mahonia* or *Berberis repens* from the Rocky Mountins, and even this has lost many of its leaves. All the forms of the European Box, although carefully protected, have suffered badly and some have been killed. Even the Japanese Box (*Buxus japonica*), which has been growing in an exposed position here for twenty years without protection, will lose for the first time some of its leaves from the ends of the branches. This handsome plant has suffered, however, less than might have been expected, and if Box is to be planted in eastern Massachusetts with the expectation that it will be a permanent garden ornament it is this Japanese species which must be used. The Chinese climbing Honeysuckle (*Lonicera Henryi*), which had proved perfectly hardy until last winter and from which much was expected, has lost all its leaves, but as its stems are still alive it may recover. *Teucrium chamaedrys* and *Salvia officinalis* are nearly killed, and *Daphne cneorum*, which has usually done well in the Arboretum, has suffered seriously in the Shrub Collection and on Azalea Path. The two evergreen Chinese Viburnums which have lived in the Arboretum for several years, *Viburnum rhytidophyllum* and *V. buddleifolium*, have lost all their leaves but may possibly recover.

Thanks probably to the abundant rains of the summer and autumn, the Rhododendrons in the Arboretum have suffered less than they did three years ago, although in some of the gardens near Boston the loss of these plants has been more serious than ever before, whole plantations which have been growing for thirty or forty years having been destroyed. In the Arboretum the only species which has suffered is *R. micranthum*, the only evergreen Chinese Rhododendron which has ever lived long enough in the Arboretum to flower and which has now lost many of its upper branches. There are dead branches on some of the Catawbiense hybrids, and among them, in addition to a number of hybrid seedlings sent to the Arboretum for trial by an English nursery, the following have been killed: James Smith, Marshall Brooks, Mrs. Thomas Agnew, Marquis of Waterford and Gomer Waterer. One specimen of Mrs. C. S. Sargent, which has always been considered one of the hardiest of all the Catawbiense hybrids, has been so injured that it will have to be removed. *Rhododendron azaleoides*, or *fragrans*, one of the hybrids between a Rhododendron and an Azalea, has also been killed.

Prunus incisa has bloomed in the Arboretum every spring for three or four years but has never been as full of flowers or as beautiful as it has been during the present week. This Cherry is a native of Japan and is abundant on the eastern and southern slopes of Fuji-san and on the Hakone Mountains. It is a large shrub or under favorable conditions a small tree twenty-five or thirty feet high; the flowers appear before the deeply cut leaves in drooping clusters; their calyx is bright

red; the petals are white or occasionally tinged with rose color, and the anthers are bright yellow. The petals fall early but the calyx, which gradually grows brighter in color, remains for some time on the young fruit and is showy. *Prunus incisa* has been perfectly hardy here and none of the flower-buds were injured by the cold of last winter. It has the advantage, too, of flowering while still a small shrub. This Cherry has remained rare in American and European gardens and appears to be still little known.

Plums. The flower-buds of few Plum-trees have been injured and these trees promise to bloom unusually well this year. The first to flower have been the Canadian Cherry (*Prunus nigra*) and the Chinese *Prunus salicina*, the parent of the so-called Japanese Plums of pomologists. These will soon be followed by *Prunus alleghaniensis*, *P. americana*, *P. Watsonii*, *P. Munsoniana*, *P. hortulana*, *P. domestica*, and several others. The Plums are planted with the Apricots, which are also beginning to bloom, next the Cherries, near the junction of the Meadow and Valley Roads.

A pink-flowered Pear-tree. Among the Pear-trees raised from the seeds collected by Wilson in western China there are plants in the Peter's Hill Nursery and on the southern slope of Bussey Hill which have bloomed this year for the first time and have been conspicuous for their pale pink flowers which open from rose-colored buds. The flowers of all described species of *Pyrus* are pure white and this pink-flowered form is an interesting addition to the list of trees with showy flowers. It has been considered a variety of *Pyrus Calleryana* but differs from that Pear-tree in its smoother red brown bark, in the dense coat of tomentum which covers the branchlets, and in its earlier pink flowers not more than three-quarters of an inch in diameter, and, it is possible that when the fruit is known, it may prove a new species. The Chinese Pears have handsome foliage and beautiful flowers, and they are all excellent hardy ornamental trees in the Arboretum. They will bloom well this year, and the large specimen of *P. ovoidea* near the Forest Hills entrance has been covered with flowers during the week.

Some Maple Flowers. It is not often that the Sugar Maple (*Acer saccharum*) in Greater Boston so completely covers itself as it has this spring with its long gracefully drooping clusters of pale yellow flowers which early in May make this tree, although now less conspicuous than in the autumn, a charming feature of the northern forest. A true lover of the country, life in cities and their suburbs has little attraction for the Sugar Maple. It needs the free and pure air of the forest and of the country roadside, and finds its greatest happiness on the low hills of northern New England and Michigan, or in the rich protected valleys of the Appalachian Mountains. In such positions no Maple tree surpasses it in size and beauty, and few trees equal it in the splendor of the coloring of its autumn foliage. The large, cup-shaped bright red flowers of one of the forms of the Japanese *Acer diabolicum* (var. *pupurascens*) have been very beautiful this week, and as a spring-flowering tree this small Maple well deserves more general cultivation. The leaves, too, are large and handsome. There are three plants in the Maple Collection, and a number of others in the mixed plantations near the top of Peter's Hill.

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MAY 11, 1918

Effects of the severe winter. Injuries to plants with deciduous leaves have fortunately been less serious than to broad-leaved Evergreens. All Azaleas are unhurt in branch and bud, with the exception of some of the flower-buds of *Rhododendron (Azalea) Kaempferi*, and promise to bloom exceptionally well. The ability of some of the hardiest of the eastern North America and the eastern Asiatic Azaleas to bear uninjured the cold of a winter like the last teaches an important lesson; and it is well to repeat what has been so often said in these Bulletins, that in these Azalea species, but not in their hybrids which are usually short-lived and not always hardy, are found some of the most beautiful of the shrubs which can be grown in this part of the country, and that for the eastern United States they are more satisfactory than any evergreen Rhododendrons. All the new Chinese Cotoneasters have come through the winter without injury with the exception of the variety *elegans* of *C. Dielsiana*, the varieties *rugosa* and *floccosa* of *C. salicifolia* some plants of *C. horizontalis* and its variety *perpusilla* which have lost the ends of the branches. The fact that most of these Cotoneasters have been able to support without injury the cold of last winter is important, for among them are some of the most beautiful of the Chinese shrubs of recent introduction. The Chinese Poplars are uninjured with the exception of *P. lasiocarpa*, which has never done well in the Arboretum, and *P. yunnanensis*, which has lost a good many branches. This tree has suffered here before and will probably not live long in eastern Massachusetts, although it has grown well in the neighborhood of New York. The Chinese Butternut

(*Juglans cathayensis*) is uninjured but some plants of *J. regia* raised here from nuts gathered by Wilson in western China have lost their buds, while others appear to be uninjured. Maples from western China, on the whole, are not promising. *Acer griseum*, *A. fulvescens* and *A. pictum parviflorum* are still in good condition, but *A. longifolia* and *A. Henryii*, which have suffered before, are now killed; and *A. Davidii*, which once flourished in the Arboretum for several years, is again badly injured. The new Cherry-trees from western China are all in good condition with the exception of *Prunus Conradinae*. This tree has always been delicate in the Cherry Collection, and the large plants on Peter's Hill have now all been killed. This handsome tree flowered two years ago on the grounds of the United States Agricultural Station at Chico, California. *Neillia sinensis* is uninjured and there appears no reason why this beautiful shrub should not become a popular ornament in northern gardens. The other Chinese species in the Arboretum, *N. longiracemosa* and *N. affinis*, have been killed to the ground but the roots are alive. The Chinese Spiraeas and Hydrangeas are uninjured, but some of the Deutzias like *D. longifolia* and the varieties of *D. discolor* have suffered as usual. Plants of all the Chinese Ash-trees are alive, although the winter has been too severe for a plant each of *Fraxinus retusa* var. *Henryi* and *F. platypoda*. *Ligustrum Delavayanum* has been killed to the ground, as has *Daphne genkwa*. The injury to this plant has been one of the serious results of the winter. The Chinese Buddleias are usually killed to the ground here; as they flower on the new shoots this is a matter of little importance, but the roots have now been killed. *Styrax americana* of the southern states has been killed and the Chinese *S. dasyantha* is so badly injured that it will not recover. Unfortunately the only species probably of this beautiful genus which can be successfully grown here are the Japanese *S. japonica* and *S. obassia*, and in this region these do not always grow as well as they have in selected positions in the Arboretum.

Forsythias. For the second time in three years many flower-buds have been killed on all the species and hybrids of this genus. On some plants, especially those in low positions, all the buds were injured but on high ground probably at least half the buds have opened. The hybrid *F. intermedia* and its varieties have suffered the most, and the Chinese *F. suspensa* and the Albanian *F. europea* have lost fewer buds than the others.

All the Chinese Berberies with deciduous leaves are practically unhurt with the exception of *Berberis Wilsonae*, which has always been rather tender here, its variety *Stapfiana*, which has always been considered a hardier plant, and *B. triacanthophora*. Few Chinese Honey-suckles have suffered, but *Lonicera pileata*, which has flowered here for several years, is killed to the ground, and the beautiful climbing *L. similis* var. *Delavayi* has been killed.

Hamamelis. All the winter-flowering Witch Hazel plants are uninjured. *Hamamelis vernalis* was covered the middle of December with flower-buds which promised to open earlier than usual but the extreme

cold later in the month destroyed them. The flower-buds of the Japanese *H. japonica* and its variety were not hurt, but they did not open until late in March or six weeks later than usual. The flower-buds of the Chinese *H. mollis* were badly injured and only partly opened toward the end of March.

Quercus arkansana, from the neighborhood of Fulton in southern Arkansas, has been killed, but the Nutmeg Hickory (*Carya myristiciformis*) raised from nuts gathered within two miles of the place where *Q. arkansana* grows is uninjured, as are *Sapindus Drummondii* from the same general region and *Malus angustifolia* from Florida. More remarkable is the hardiness of *Carya texana*, the so-called Bitter Pecan, raised here from nuts gathered on the lower Brazos River in one of the hottest parts of the Texas coast region where sugar is the principal crop. On the other hand, more northern trees like the Liquid-amber and the Persimmon (*Diospyros virginiana*) have lost many buds and will certainly be disfigured. These are not Massachusetts trees but they are natives of southern Connecticut and have been growing for years in the Arboretum; and it might well have been supposed that they would be hardier than trees from southern Arkansas, Florida and the Texas coast. But the hardiness of a plant can only be determined by experiments conducted through many years, as the effects of the last winter have clearly shown. It is the office of the Arboretum to make such long sustained experiments and to report on the results obtained from them, and if nurserymen and other planters will study this work of the Arboretum they will be saved many disappointments and the loss of valuable time and unnecessary expenditures.

Asiatic Crabapples. Some of these trees are blooming very early this year and many of them are carrying an unusually large crop of flowers. Much attention has been paid at the Arboretum to this collection because few plants have more beautiful flowers and fruits or are better suited to this northern climate, and as the Apples of pomologists have been obtained by crossing a few of the species of the wild Crabs there is a chance that the future may disclose new and perhaps improved races of Apples obtained by crossing some of the recently introduced species with some of the varieties of orchard Apples. A general interest in this collection is shown by the number of requests for Crabapple grafting wood which are sent to the Arboretum from Agricultural Experiment Stations and nurserymen from all the northern parts of the country. The Arboretum collection is a large one and now contains well established plants of all the wild Crabapples with the exception of the Himalayan *Malus sikkimensis* which has not always been quite hardy here. It also contains many hybrids both of Asiatic and American species. The Asiatic species and several of the American species, as well as many hybrids, are now large enough to flower and produce fruit, and the collection affords an excellent opportunity for study. The Crabapples are in two groups, the first on the left-hand side of the Forest Hills Road, and the second at the eastern base of Peter's Hill where will be found the greatest number of species. The Japanese and Chinese species can be considered hardy as they have not been injured by the past winter, with the exception of *Malus yunnanensis*.

Some of the plants of this small tree are dead or badly hurt, but one tree in the nursery at the top of Peter's Hill is uninjured.

Malus cerasifera. The earliest of the Asiatic Crabs to bloom is believed to be a hybrid between *Malus baccata* and *M. prunifolia*, which has generally been called *M. cerasifera*. It is one of the largest of these trees, and in good soil and with abundant space it can form a wide-branched, round-topped, shapely tree. The flowers are larger than those of other Asiatic Crabapples, pure white and fragrant, and the fruit is globose, rather dull red, and sometimes an eighth of an inch in diameter.

Malus baccata var. mandshurica. Another desirable Crabapple as a flowering tree is the variety *mandshurica* of *M. baccata*, a common north China, Korean and Japanese plant. This has pure white flowers only a little smaller than those of *M. cerasifera* and more fragrant perhaps than those of any other Apple-tree. Last week a good specimen of this Crabapple in the Peter's Hill Collection was covered with flowers which perfumed the air for a long distance. Another still little known species, *Malus micromalus*, has been unusually attractive with its small pink flowers. This is a tree with erect branches which form a narrow pyramidal head, and smooth pale bark. Its habit will make it valuable in many gardens.

Korean Azaleas. On the upper side of Azalea Path two Korean Azaleas, *Rhododendron Schlippenbachii* and *R. poukhanense* have been covered with flowers during the past week. The former has large ob-ovate leaves and white flowers more or less tinged with rose, and from three to three and one half inches in diameter; the corolla is thin and delicate in texture, and when fully exposed to the sun soon fades. The flowers will probably last longer in partial shade. The plants appear perfectly hardy in the most exposed position. This is a common shrub on the grassy slopes above the cliffs on the Korean coast and other parts of that country, but has remained little known in gardens, although its flowers are perhaps the loveliest of all Asiatic Azalea flowers. *Rhododendron poukhanense* has been covered again, as it has been every spring for several years, with its clear rose-colored fragrant flowers. This is one of the best of the Azaleas introduced by the Arboretum into American gardens, and a hardy decorative plant of first-rate importance.

An illustrated guide to the Arboretum containing a map showing the position of the different groups of plants has been published. It will be found useful to persons unfamiliar with the Arboretum. Copies of this guide can be obtained at the Administration Building in the Arboretum, from the Secretary of the Massachusetts Horticultural Society, 300 Massachusetts Avenue, Boston, from The Houghton, Mifflin Company, 4 Park Street, Boston, and at the office of the Harvard Alumni Bulletin, 18 Plympton Street, Cambridge. Price, 30 cents.

ARNOLD ARBORETUM
HARVARD UNIVERSITYBULLETIN
OF
POPULAR INFORMATION

JAMAICA PLAIN, MASS.

MAY 16, 1918

Effects of the Severe Winter. The condition of the new Chinese Roses in the Shrub Collection is not as bad as might have been expected and will perhaps interest persons who are beginning to cultivate these plants. The yellow-flowered species, *Rosa Hugonis*, the single and double-flowered forms of *R. xanthina* and *R. Ecae* from Chinese Turkestan are uninjured. The last has been considered rather a tender plant here. The least beautiful, perhaps, of yellow-flowered Roses it has considerable geographical interest. The following are also uninjured: *R. davurica*, *R. sertata*, *R. Helenae*, *R. Sweginzowii*, *R. banksiopsis*, *R. saturata*, *R. setipoda*, *R. bella*, *R. omeiensis*, and *R. multiflora cathayensis*. The stems of the following have been killed to the ground or nearly to the ground, but the roots are probably alive: *R. corymbulosa*, *R. Davidii*, *R. Prattii*, *R. filipes*, *R. Moyesii*, *R. Moyesii rosea*, *R. Gentiliana*, and *R. multibracteata*. *R. Willmottae*, which grows well at Rochester, N. Y., but has always been tender in the Arboretum, appears to be dead. Additions to the number of Chinese Maples mentioned in the last Bulletin which have been killed are *Acer sinense* and *A. tetramerum*. The latter flowered in the Arboretum a year ago. Other Chinese plants which have been killed are *Stachyurus chinensis*, *Sophora viciifolia*, *Viburnum ovatifolium*, *Staphylea holocarpa*, *Sorbus pallescens*, *Poliothyrsis sinensis*, *Fortunearia sinensis*, *Sycopsis sinensis*, *Liquidambar formosana monticola*, and the Chinese form of *Symplocos paniculata*. The *Sophora* has been growing in the Arboretum since 1906, and as it has for several years flowered and produced great crops of seeds here it was believed to be one of the hardiest as it is one of the most beautiful shrubs of recent

introduction. All the plants of *Viburnum ovatifolium* are killed, but plants of the other Chinese *Viburnums* with deciduous leaves are alive and in good condition. *Staphylea holocarpa*, which when in flower Wilson considered one of the most beautiful of the Chinese trees, has always been tender in the Arboretum and it is not probable that it will ever flourish here.

Some interesting shrubs have been killed to the ground but will probably recover; among them are the two Chinese *Dipeltas*, the Chinese *Rhus Potaninii*, the Chinese *Cornus paucinervis*, and the Chinese *Salix Bockii*. *Osmaronia* or *Nuttallia cerasiformis* from the Pacific coast, the Rocky Mountain *Ceanothus Wrightii*, all the Bladder Sennas (*Colutea*), and the Japanese *Benzoin ericium* and *B. obtusilobum*; the last, which for twenty-five years has been one of the rare and interesting plants in the Arboretum, will probably not recover. The familiar *Exochorda racemosa* or *grandiflora* has suffered badly, but the less known and handsomer species from western China, *E. Giraldui* and *E. Giraldui Watsonii* are uninjured and are now in flower. *E. macrantha*, a hybrid between *E. racemosa* and *E. Korolkowii* is uninjured and is also in bloom. Many of the forms of the Japanese *Prunus Lannesiana* have suffered badly and several are dead. Among these are some of the double-flowered Cherries which are generally cultivated in Japan.

There are some serious losses among the Oaks. All the trees of the Willow Oak (*Q. Phellos*) of the south are dead. The largest of them here had been growing in the Arboretum since 1877 and had not been injured before. The largest plant of *Quercus georgiana* is dead. This is a rare tree from the Stone Mountain region of central Georgia, and the plant that has now been killed had been uninjured in the Arboretum for twenty-one years. Many large trees of the Shingle Oak (*Quercus imbricaria*) are seriously injured, and plants of the southern Red Oak (*Quercus rubra* or *falcata*) which have been growing here since 1889 are killed. *Quercus heterophylla*, which has been growing uninjured in the Arboretum since 1879, is also killed. This handsome and interesting tree is the first hybrid Oak noticed in America and has given rise to many discussions among dendrologists. All the plants of the Turkey Oak (*Quercus Cerris*) are killed, and all the upper branches of a large specimen of the form of the common English Oak with pendulous branches (*Q. Robur pendula*) planted in 1899 are dead. Two southern Nettle-trees, *Celtis mississippiensis* and *C. georgiana*, have also been killed.

Early-flowering Lilacs. The earliest flowering Lilac here in other years, *Syringa affinis*, is not blooming this year and there are not many flowers on its variety *Giraldui* with pale rose-colored flowers. The flower-buds of these Lilacs are perfectly hardy and the cold winter cannot be charged with the absence of flowers on these north China plants. They are tall shrubs of loose and rather ungainly habit, but the foliage is good and the flowers are extremely fragrant. Another north China Lilac, *S. oblata*, is blooming well this year although the flower-buds are often injured by the cold of less severe winters. If this Lilac

always flowered as well as it has this spring it would be one of the most valuable of the whole group for it blooms early, and the pale lilac-colored flowers in short compact clusters are very fragrant. The large broad leaves which are thick and leathery and are not disfigured by mildew turn in the autumn to handsome shades of orange and red. One of the first hybrid Lilacs was obtained by crossing this Chinese species with the common Lilac (*S. vulgaris*). The plant obtained by this cross is called *S. hyacinthiflora*. It is a large, compact, round-topped shrub with leaves resembling in shape those of its Chinese parent and with small clusters of extremely fragrant, pale lilac-colored double flowers. As a garden plant this Lilac is more interesting than beautiful. *Syringa pubescens* is covered with clusters of opening flower-buds. Attention cannot be too often called to this native of northern China. It is a tall shrub with erect stems, small leaves and short broad clusters of pale lilac-colored flowers remarkable for the long tube of the corolla and for their pungent and delightful fragrance. For this fragrance, if for no other reason, this Lilac should be found in every northern garden; indeed some persons consider it the most valuable of all Lilacs. Although *S. pubescens* was first raised at the Arboretum thirty-six years ago, it is still rare in this country, for it never produces seeds here and is not as easily propagated by cuttings as other Lilacs. It is in bloom nearly four weeks earlier than it was last year. Indeed all the Lilacs are early this year, and by the time this Bulletin reaches its Boston readers many of the varieties of the common Lilac will be in full bloom.

Early-flowering Hawthorns. The earliest Hawthorn this year to bloom was *Crataegus nigra* from western Europe. This is a handsome tree with pale bark and deeply lobed leaves. The flowers have twenty stamens with anthers faintly tinged with pink and are arranged in compact clusters; they are followed by handsome black shining fruits which give greater value to this tree than the flowers which are less beautiful than those of many American Hawthorns. There is a large plant of *Crataegus nigra* in the old Hawthorn Collection at the end of the Willow Collection. Several American Hawthorns of the Mollis Group, distinguished by their large flowers, large leaves and large scarlet fruit, have been in bloom during the past week. The most conspicuous have been *C. Arnoldiana*, *C. mollis*, *C. arkansana* and *C. submollis*. These trees have never flowered more profusely. *C. Arnoldiana*, which was first found growing wild in the Arboretum, has been especially handsome. The fruit of this tree begins to ripen late in August or early in September and this makes *C. Arnoldiana* valuable also for the decoration of the summer garden. The largest plants of this tree in the Arboretum are on the left-hand side of the road near the Centre Street entrance. There are a number of good trees in the old *Crataegus* Collection and on the Valley Road in front of the White Oaks. Large plants of the other early-flowering Mollis species can be seen at the South Street entrance. In the *Crataegus* Collection on the eastern slope of Peter's Hill many plants are already in bloom and for the next six weeks it will be possible to see in the Arboretum Hawthorn flowers of many native and foreign species.

Early-flowering Cotoneasters. Two of the handsomest Cotoneasters, *C. multiflora calocarpa* and *C. racemiflora soongorica*, are in bloom on the southern slope of Bussey Hill. They are tall broad shrubs with white flowers in compact clusters standing up along the whole length of the long, slender, graceful, arching branches. Handsome as these plants are in May they are even handsomer in the autumn when their large and abundant red fruits are ripe. These two shrubs, which have now been well tested in the Arboretum, give every promise of becoming important garden plants in the northern states.

Late-flowering Amelanchiers. The arborescent Shad Bushes, *Amelanchier canadensis*, *A. laevis* and *A. oblongifolia*, dropped their petals nearly two weeks ago, but the flowers of some of the shrubby species are still in good condition and attractive subjects for the spring garden. Among the last of these to flower are the two Old World species, *A. vulgaris* of Europe and *A. asiatica* of eastern Asia. Some of the handsomest of the late-flowering American species are *A. sanguinea*, *A. stolonifera*, *A. florida* and *A. pumila*. The Amelanchier Collection is on the grass path on the left of the Meadow Road not far beyond the Administration Building.

Malus Arnoldiana. In the last Bulletin attention was called to the hybrid Crabapple, *Malus cerifera*. This plant is probably one of the parents of another hybrid which sprang up spontaneously in the Arboretum many years ago and has been called *M. Arnoldiana*. The other parent is probably *M. floribunda*, itself believed to be a hybrid which originated in China. If this view of the origin of *M. Arnoldiana* is correct, it is the offspring of two hybrids of different parentage and a good illustration of what can be obtained by crossing and recrossing the Crabapples. It is a low, broad, bushy tree with long arching upper branches which are raised well above the general head of the plant and are wonderful objects when clothed from end to end with flowers and the blue sky is seen between them. The flower-buds, like those of *M. floribunda* are deep rose color and the petals after the flowers open gradually turn from rose color to white. The flowers, however, are as large as those of *M. cerifera*, or nearly twice as large as those of *M. floribunda*, and the fruit which is red is intermediate in size between those of the parents. The plant of the Arnold Crab in the Forest Hills Road Group and several plants in the Peter's Hill Group have not before been more full of flowers or more beautiful.

Early-flowering Buckeyes. The first of these plants to flower this year is the form of the Ohio Buckeye from northern Missouri with leaves of seven instead of five leaflets (*Aesculus glabra Buckleyi*). The flowers of this variety are brighter yellow and handsomer than those of the common form of this tree, and the plants in the Arboretum collection which are now covered with flowers are more beautiful than ever before. The flowers of the typical form with leaves of five leaflets open only a few days later than those of this north Missouri tree. The largest specimen of the Ohio Buckeye in the Arboretum is on the left-hand side of the South Street entrance. Another form of this tree, var. *leucodermis*, from southern Missouri and northern Arkansas has smoother bark and blooms later. In the Arboretum collection the flower-buds are not more than half grown.

ARNOLD ARBORETUM

HARVARD UNIVERSITY



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OF

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Lilacs. Some of the best of the newer varieties of the common Lilac (*Syringa vulgaris*) have been in bloom during the past week and the following are worth the attention of persons who make Lilac collections: Deuil d'Emile Gallé, with pale pink double flowers; Waldeck Rousseau, with pink single flowers; L'Oncle Tom, with dark red-purple single flowers; Grand Duc Constantin, with light lilac-colored flowers; Toussaint Louverture, with unusually long narrow clusters of red-purple flowers. This is a tall growing plant with erect stems and of not particularly good habit, but the long narrow clusters of flowers are attractive. De Mirabel, with single very dark lilac-colored flowers in long narrow clusters; Edmund Bossier, with dark rose-purple single flowers in large broad clusters; Maurice de Vilmorin, with pale, lilac-colored double flowers; President Loubet, with deep lilac single flowers; Languis, with pale pink single flowers opening from dark rose-colored buds; and Réamur, with large, single, rose-colored flowers in broad clusters. An unusually large number of the varieties of the common Lilac have flowered well this year and among the older varieties the following have been unusually good: Congo, with large, dark red-purple, single flowers; Macrostachya, with pale pink, single flowers in long narrow clusters. Like Toussaint Louverture, this variety has erect stems which do not make a handsome bush, and the flowers, too, begin to open before the leaves appear. The flowers, however, are so delicate in color that some persons consider this one of the handsomest garden Lilacs. Other varieties which have been unusually good are Marliensis pallida, with broad clusters of pale pink flowers; Furst Lichtenstein, with single pink flowers; Condorcet, with double pale blue

flowers opening from dark rose-colored buds; Justi, with small pale blue flowers; Ludwig Spath, with dark red-purple single flowers. This last is very similar to Philemon and in these two plants are found probably the handsomest Lilacs with dark red-purple flowers. Marie Legraye, with single white flowers, is good as usual. Some of the white-flowered Lilacs recently produced in France have larger individual flowers, but little is known here yet of their value as garden plants, and Marie Legraye must still be considered the best of the thoroughly tested single white-flowered Lilacs.

Syringa chinensis. Unfortunately named for it is not Chinese but a hybrid which appeared more than a century ago in the Botanic Garden at Rouen, *Syringa chinensis* is also now in bloom. Obtained by crossing the common Lilac with the Persian Lilac (*S. persica*), it has the slender branches, the small leaves and the small flowers of the latter, but its large size, the large flower clusters and the color of the flowers show the influence of the other parent. *Syringa chinensis* is one of the most valuable of all Lilacs; it is perfectly hardy, it grows rapidly to a large size, and it never fails to produce its long clusters of reddish lilac flowers which cause the slender branches to droop gracefully. There is a variety with white flowers tinged with pink (var. *alba*) and other varieties with slightly darker or lighter flowers than those of the common form. This hybrid flowers a few days earlier than the Persian Lilac. This is a broad rather low shrub with narrow pointed leaves and small, fragrant, pale lilac-colored flowers in few-flowered clusters which are crowded at the ends of the branches and appear like one long inflorescence. There is a white-flowered form (var. *alba*) and one with lobed leaves (var. *laciniata*). A native of Afghanistan, the Persian Lilac was cultivated in India and Persia from very early times and reached Europe three hundred years ago. A very old inhabitant of American gardens, it is now not often cultivated in this country. The earliest of the new Chinese Lilacs to bloom this year, *Syringa microphylla* is in bloom. It is a plant with small leaves and small, pale pink, fragrant, long-tubed flowers in small short clusters. The flowers resemble those of *S. pubescens*, but it is a less valuable garden plant.

Bush Honeysuckles. Many of the Bush Honeysuckles are again covered with their fragrant flowers. No shrubs, not even the Lilacs, are more valuable garden plants in regions of extreme cold. They are very hardy; they flower freely every year, and many of the species and hybrids are covered in early summer with scarlet, yellow or blue fruit. To obtain the greatest beauty of these shrubs they must be planted in good soil with sufficient space between them for their free growth. An example of well-grown Bush Honeysuckles can be seen on the right-hand side of the Bussey Hill Road opposite the Lilacs where there are several large plants. There is a large collection of smaller plants in the Shrub Collection, and a supplementary collection along the grass path in the rear of the Linden Collection on Meadow Road. Attention is called again to *Lonicera Morrowii*, because the plant usually sold in American nurseries under that name is not *L. Morrowii* but a hybrid of that species with the Tartarian Honeysuckle and of

little value for those who want a plant with the peculiar habit of *L. Morrowii*. This species is a native of northern Japan and eastern Siberia, and one of the handsomest of the Bush Honeysuckles. It is a comparatively low round-headed shrub with the lower branches which cling close to the ground and spread over an area much broader than the height of the plant. The leaves are gray-green and the flowers are large, pale yellow and white; the fruit, which remains a long time on the branches, is red and lustrous. The shrub was introduced into the United States by the Arboretum many years ago and at one time was largely planted in the Boston parks where there can still be seen some large specimens. Attention is also called to the different forms of the Tartarian Honeysuckle *L. tatarica*, with white, pink and rose-colored flowers, *L. minutiflora*, *L. muscaviensis*, *L. Xylosteum*, *L. orientalis*, *L. chrysantha*, one of the earliest of the group to bloom, *L. bella*, *L. notha* and *L. microphylla*. This very attractive little bush, a native of central Asia, is now in flower. The pale canary yellow flowers are longer than the small pale blue leaves and stand well up above them; the bright red, long-stalked fruit of this shrub is also attractive.

Mountain Ashes. On the right-hand side of the path leading to the Shrub Collection from the Forest Hills Gate are now in flower or will soon be in flower, a number of these plants, including the two of northeastern North America, *Sorbus americana*, and its variety *decora*. These are large shrubs or small trees and less showy perhaps when in flower than some of the Old World species; they surpass, however, all other plants of this genus in the brilliancy of their fruit, and in the size of their fruit clusters. The autumn coloring of the leaves of these plants, too, is beautiful. There is another collection of Mountain Ashes, principally Asiatic, on the left-hand side of the Valley Road near the group of Swamp White Oaks (*Quercus bicolor*) and several of these plants are now in bloom. There is a good specimen of the Japanese *Sorbus alnifolia*, one of the simple-leaved species, now in flower on the right-hand side of the Forest Hills Road near the Wistaria trellis. This is a shapely, hardy tree which was raised at the Arboretum from seed twenty-five years ago and is well worth a place in Massachusetts gardens. All the species of *Sorbus* are liable to injury from the San Jose scale, but this can be easily controlled by spraying the trees late in March or in early April with a solution of lime-sulphur or with scaly-side.

Aesculus arguta. This little shrub, which is a native of eastern Texas and Oklahoma, is blooming for the first time in the Arboretum and probably for the first time in cultivation. Its relation is with the Ohio Buckeye; it has leaves of seven or nine narrow, long-pointed, pale leaflets, long, many-flowered clusters of pale yellow flowers and fruit covered with prickles. This shrub is common near Dallas and in Cherokee County, Texas, where it was first distinguished, and in Oklahoma, it ranges further west than the other Buckeyes. The plants in the Arboretum collection have been raised from seeds collected in central Oklahoma. Some of the other little known southern Buckeyes have escaped injury and will soon be in bloom. Among them are the

handsomest and most widely distributed red-flowered species, *Aesculus discolor* var. *mollis*, when in flower one of the handsomest shrubs in the southern states. *Aesculus georgiana* with large red and yellow flowers in compact clusters, its variety *pubescens* and two hybrid Buckeyes, *Aesculus Bushii* and *A. Harbisonii*. While these have all escaped injury the summer-flowering *Aesculus parviflora*, which is an old inhabitant of northern gardens and which has not before been injured in the Arboretum, has lost many stems.

The earliest Roses. On May 17th the first flowers of the season on the earliest Roses opened, *Rosa Ecae* and *R. Hugonis*. The former is a native of central Asia and is a small, exceedingly spiny shrub with small leaves and pale canary yellow flowers not more than an inch in diameter. *R. Hugonis* is a large shrub with gracefully arching stems; the flowers are about two and a half inches in diameter, with bright clear yellow petals and are very fragrant. The plant in the Shrub Collection is not quite as full of flowers as it was last year, but for the next few days this Rose will be one of the most interesting and beautiful plants in the Arboretum.

Rhododendron (Azalea) japonicum is in bloom on the lower side of Azalea Path. This is one of the parents of the hybrid *Azalea mollis* of gardens, and has the flame-colored flowers of some of the forms of that plant. *R. japonicum*, however, is a much more desirable plant than any form of *Azalea mollis* which at best is only short-lived here. Although discovered and first described many years ago, *R. japonicum* has always been one of the least known in gardens of the hardy Azaleas. The large plants in the Arboretum were raised from seed brought from Japan by Professor Sargent in 1892, but little attention has been paid to them until recently as they were supposed to be *Azalea mollis*. Now it is believed here that *R. japonicum* is the handsomest of all the hardy Asiatic Azaleas and a garden plant of exceptional value. Although the Arboretum plants are not blooming as freely as last year, there are flowers enough on them to show their beauty.

Deutzia grandiflora flowered in the Arboretum for the first time three years ago and has been again in bloom among the Chinese Shrubs on Bussey Hill. It is a dwarf plant with flowers about three-quarters of an inch in diameter, and usually solitary or occasionally in two- or three-flowered clusters. It is a native of northern China and there is reason to hope that it may in the hands of a skilful hybridizer be as valuable as another north China species, *Deutzia parviflora*, was in producing a race of hardy garden Deutzias.

The flower-buds of the Flowering Dogwood (*Cornus florida*) are killed, and visitors to the Arboretum will be deprived this year of the enjoyment of the conspicuous flowers of this tree which is one of the most interesting inhabitants of the forests of eastern North America.

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The early spring. The cold of last December exceeded the cold of any previous December in Massachusetts of which there is a record, and now in this month there have been the hottest May days eastern Massachusetts has known since a record of temperature has been kept. April, too, was warm and dry, and even the early-flowering shrubs bloomed earlier than usual. Lilac flowers, which last year did not open in time for Decoration Day were fading this year by the 19th of May, and *Viburnum Lentago*, which usually blooms here about the middle of June was opening its flowers on the 20th of May and for the last ten days has been one of the conspicuous plants in the Arboretum. Many plants, especially Crabapples, Pears, Lilacs, Hawthorns, Honey-suckles and Viburnums have not before flowered more profusely and those which normally bloom a week or two apart have this spring flowered simultaneously, with the result that during one or two weeks more flowers have been open in the Arboretum than in any other weeks in its history. The spring, however, has not been a satisfactory one, so many plants have flowered together that visitors have been unable to enjoy them all; and flowers forced by excessive heat to open before their natural time have been short-lived. Plants crippled by the winter have further suffered by the heat and drought of May which have seriously interfered with the recovery of some plants.

Some early-flowering Rhododendrons. During the past week several Rhododendrons have been in flower. One of the handsomest of these plants, *Boule de Neige*, shows no effects of a hard winter. The leaves

are as green as they were in October and the flower-buds have not been injured. It is a dwarf plant rarely growing to the height of three feet but the branches are wide-spreading and form a broad, compact, round-topped head. Little appears to be known of the history of this plant; it is evidently a hybrid and *R. caucasicum* is no doubt one of the parents. Judging by the leaves, *R. catawbiense*, or one of its hybrids, may be the other parent. The French name suggests that it was raised in France as does the name of the raiser, Oudieu, given in a recent English work on Rhododendrons. The Arboretum will be glad of information about the origin and parentage of this plant. Whatever these may have been Boule de Neige seems one of the hardiest Rhododendrons which can be grown successfully in this climate. Another dwarf Rhododendron, Mont Blanc, a variety or hybrid of *R. caucasicum*, flowered a few days earlier than Boule de Neige. It is a dwarfer plant and the flowers are rose color when they first open but soon become pure white. This is a plant which has bloomed in the Arboretum for several years and has never been injured. The history of its parentage and origin are not recorded. A hybrid, *R. caucasicum*, with rose-colored flowers, sold in nurseries as *R. Jacksonii* although that name properly belongs to another hybrid, has lost a good many leaves and some of the flower-buds. *R. carolinianum* is uninjured and has been flowering for the past ten days. The fact that it has been able to come through the past winter without losing a leaf or bud speaks well for the ability of this little southern plant to adapt itself to the New England climate. The form usually cultivated has pale rose-pink flowers, but the form with pure white flowers is the more common in the mountain forests of the Carolinas which is the home of this species. *R. Smirnowii*, uninjured by the winter, is again in bloom. This inhabitant of the Caucasus is a large shrub with pale gray-green leaves coated below with a thick mat of pale felt and large pink or rose-colored flowers. This plant is so hardy that it is not improbable that a new race of Rhododendrons adapted to this climate can be obtained by crossing it with *R. catawbiense*, *R. maximum* and other hardy species. The felt on the lower surface of the leaves protects them from the attacks of the lace-wing fly which has been so destructive to Rhododendrons here in recent years, but unfortunately the leaves of the hybrids of *R. Smirnowii* which have been raised have entirely lost this protection.

Cotoneaster hupehensis. The plants of this shrub in the Shrub Collection and on the southern slope of Bussey Hill are again covered with flowers. It is a broad tall shrub with wide-spreading, arching branches and small clusters of white flowers which stand up well above the leaves. The fruit is scarlet and lustrous. This species and the two mentioned in the fourth number of these Bulletins, *C. multiflora calocarpa* and *C. racemiflora soongorica* are the handsomest of the Cotoneasters discovered by Wilson in western China and perhaps the most valuable shrubs for the northern states which have been introduced by the Arboretum in recent years. *Cotoneaster divaricata* and *C. nitens* are both covered with their small pink flowers. The lustrous leaves of these plants are attractive through the season.

Midseason Lilacs are in bloom nearly three weeks earlier than usual. The best known of them, *Syringa villosa*, was raised at the Arboretum nearly thirty-five years ago and from the Arboretum has been carried into many American gardens. It is a large, round-topped shrub with large leaves and compact broad or narrow clusters of pale rose-colored or nearly white flowers which unfortunately have the disagreeable odor of Privet flowers. In spite of the disagreeable odor of the flowers this Lilac is a first-rate garden plant, and particularly valuable because it does not begin to bloom until most of the flowers of the different varieties of the common Lilac have faded. The Hungarian Lilac, *S. Josikaea*, a tall shrub with violet-colored flowers in narrow clusters, blooms a few days later than *S. villosa*. It is one of the least attractive of all Lilacs but crossed with *S. villosa* it has produced in France a race of hybrids of great beauty to which the general name of *S. Henryi* has been given. One of the handsomest of these hybrids, *Lutèce*, is now covered with its large open clusters of red-violet flowers. This is one of the handsomest Lilacs of recent creation and deserves the attention of the lovers of these plants. Another of this race of hybrids, *S. eximia*, blooms a few days later and has more compact clusters of rose-colored or reddish flowers which after opening become light pink. Another of these midseason Lilacs, *S. Wolfi*, is also in bloom. This is a little known species from northern China, and has leaves like those of *S. villosa*, but the flowers are smaller and violet-purple, and the flower-clusters are much larger. This promises to be a valuable shrub in northern gardens. It blooms a few days earlier than *S. Koehneana*, a native of Korea, a large shrub with slender drooping branches and broad, unsymmetrical clusters of slender rose-colored or pink flowers which have little perfume. Although this plant has been growing in the Arboretum for sixteen years, it did not begin to flower freely until two years ago.

Crataegus pinnatifida. In the thirty-five years this plant has been an inhabitant of the Arboretum it has never been more covered with flowers than during the past week. It is a native of eastern Siberia and northern China and is an arborescent shrub or small tree. The leaves are large, deeply lobed, thick, and lustrous on the upper surface; the flowers are large, in many-flowered compact clusters, and are followed by dull red, oblong fruit about three-quarters of an inch in length. The fruit is less valuable for jelly than that of some of the American Crabapples of the *Mollis* Group. It is esteemed by the Chinese, however, who plant and carefully cultivate orchards of this Hawthorn in the neighborhood of Peking. If a selection of the six handsomest Hawthorns of the world was to be made many persons would include in the six this Chinese species.

Cornus controversa. It is fortunate that the winter has had no bad effect on this tree which promises to be one of the important introductions from eastern Asia. Like our *Cornus alternifolia*, it has wide-spreading branches and alternate leaves, but the flower-clusters are larger. It is a larger tree, sometimes growing in western China to the height of sixty feet. It is now in bloom in the supplementary

Cornel Collection on the right-hand side of the Meadow Road and in the Peter's Hill Nursery where the largest specimen in the Arboretum can be seen.

Early American Azaleas. The first flowers of the earliest of these plants, *R. (Azalea) Vaseyi*, have already faded. *R. nudiflora* and *R. canescens* have been in flower for a week on Azalea Path. Of the latter, which is a native of Massachusetts, there is a good mass on the right-hand side of the Meadow Road in front of the Lindens which for a long distance round has filled the air with delicate perfume. On Azalea Path the flower-buds of the Appalachian *R. (Azalea) calendulaceum* are already open. In flower the most beautiful of Azaleas, no other North American shrub equals it in the splendor of its bloom.

Berberis Vernae. Many of the new Barberries with deciduous leaves discovered by Wilson in western China bloom much later in the season, but a plant of *Berberis Vernae* in the collection of Chinese Shrubs on the slope of Bussey Hill is now covered with its short clusters of light yellow flowers. It is an attractive shrub with gracefully drooping branches and small bright green leaves, and promises to be a good addition to the large number of hardy Barberries which can be grown successfully in this climate.

Early Diervillas. The first of these plants to bloom, the Korean *Diervilla florida venusta*, is one of the hardiest and when in flower perhaps the handsomest of all the species and hybrids of Diervilla, better known as Weigela. The New England winter has no terrors for this Korean plant, and it has not before been more thickly covered with its handsome rose-colored flowers. It is growing in the Shrub Collection and on Hickory Path near Centre Street. Varieties or hybrids of *Diervilla praecox*, a plant of uncertain origin, raised recently in France, have flowered well this spring in the Shrub Collection and deserve the attention of the public. The following varieties have been conspicuous: Vestale with white flowers, Gracieux with pink and white flowers, Conquérant with rose-colored flowers, and Fleur de Mai with pink flowers.

Rosa spinosissima, var. *altaica* (or *grandiflora*) has not been hurt by the winter and has been full of flowers as usual. This is one of the largest and perhaps the handsomest of all the varieties of the so-called Scotch Rose. It is a native of southern Siberia and in this climate often grows six or seven feet tall and broad. The flowers are faintly tinged with yellow and are produced in great numbers. It is one of the handsomest and hardiest of all single-flowered Roses which can be grown in northern gardens; and as the plant produces suckers freely, and as these are easily transplanted, there is no reason why this Rose should not be more common than it is in American gardens.

ARNOLD ARBORETUM
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OF
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The New Chinese Lilacs. Many of the Lilacs discovered by Wilson and other travellers in the recent explorations of western and northern China are now so well established in the Arboretum and in a few other American gardens that it is possible to form an opinion of their value. Observations of the living plants show that too many species were made when botanists had only the dried specimens sent home from China to work with. Now that most of these plants have flowered in the Arboretum and have been again studied it appears that *Syringa Wilsonii* and *S. Dielsiana* are the same as *S. tomentella*; that *S. Sargentiana* is a variety of *S. Komarowii* with a pubescent calyx; that *S. tetanoloba* is *S. Swegenzowii*, and that *S. Rehderiana* is probably only a pubescent form of *S. tomentella*. *S. Komarowii Sargentiana* is not in the Arboretum collection and probably has not been introduced. *S. Rehderiana*, *S. Potaninii* and *S. verrucosa* are still unknown in gardens. As a garden plant the handsomest of the new Chinese Lilacs is *Syringa reflexa* which Wilson discovered in western Hupeh. This is a tall broad shrub with leaves resembling in size and shape those of *S. villosa*. The flowers have long slender corolla-tubes and are borne in long, wide-branched, open, drooping clusters; the flower-buds are red but as the flowers open the corolla becomes dark rose color except the inner surface of the lobes which is white. The wide drooping clusters, and the contrast in the colors of the inner surface of the corolla-lobes and its tube, make *S. reflexa* one of the handsomest and most interesting of the new Chinese Lilacs. Next in merit probably as an

ornamental plant is *Syringa Sweginzowii*. This, too, is a tall shrub but the branches are not as stout as those of *S. reflexa*, and the leaves are narrower, pointed at the ends and pale on the lower surface. The flowers are produced in broad erect clusters and are pale rose color and half an inch long. The flower-buds are of a peculiar brownish green color, and as the flowers open gradually from the bottom to the top of the cluster the contrast between the open flowers below and the closed buds above give this plant a peculiar appearance during the week or ten days the flowers are opening. This Lilac was first made known through plants raised in the Arboretum of Max von Sivers at Riga in Russia from seeds sent from some place in Mongolia or northern China, the name of which is not recorded. Later it was found by Wilson in western China, but the plants growing in the Arboretum were obtained from the nursery of Regel & Kesselring in Petrograd. *S. Komarowii* has leaves which resemble those of *S. reflexa* but the flowers are produced in short, compact, nearly cylindrical clusters nodding on long stems. The flower-buds are bright red and very conspicuous, and the open flowers are deep rose color. This Lilac sometimes blooms profusely when still a small bush. *Syringa tomentella* promises to grow taller than the other new Chinese Lilacs for some of the plants in the Arboretum are now nearly ten feet high. The leaves resemble those of *S. villosa*, and the flowers are pale rose color or white, and are borne in narrow erect clusters. None of the Arboretum plants have ever produced many flowers and *S. tomentella* promises to be one of the least desirable of the new Lilacs as a garden plant. *Syringa Julianae* flowers earlier than most of the new Chinese Lilacs and the flowers are already fading. As it grows here this is a compact low shrub nearly as broad as high, and for several years has covered itself with short clusters of rose-colored and white fragrant flowers. Related to the Chinese *S. pubescens*, it blooms much later than that and other related species, and is an excellent addition to the list of Lilacs which can be grown in our gardens. *Syringa Wolfii*, which has dark violet-purple flowers in short compact clusters, is another good garden plant in this climate. This species, too, was first cultivated by Von Sivers at Riga who obtained it from some place in northern China which is not known. The other new Chinese Lilacs in the Arboretum, *S. Meyeri*, *S. microphylla*, *S. pinnatifolia* and *S. yunnanensis* have comparatively little decorative value and are curiosities rather than good garden plants.

The Yellowwood or Virgilia. This tree, the *Cladrastis lutea* of botanists, is now covered with long drooping clusters of pure white pea-shaped flowers which make it one of the most beautiful trees in the forests of eastern North America. It is a round-topped tree sometimes sixty or seventy feet in height, with pale smooth bark which resembles that of the American Beech-tree, and large light green compound leaves which turn clear yellow in the autumn before falling. In the forest this is a rare and local tree, and is found growing, usually on river cliffs, from western North Carolina to Tennessee, Kentucky and northern Alabama, and in southern Missouri and northern Arkansas. It is most abundant probably in the neighborhood of Nash-

ville, Tennessee. Sent to France by its discoverer, the elder Michaux, it has been in cultivation for more than a century. One of the first, and perhaps the first specimen planted in the United States was standing a few years ago in the grounds of the Philadelphia Cricket Club near that city. It was planted in Massachusetts, where it is perfectly hardy, at least eighty years ago. This tree flowers well in France and Germany, but rarely produces flowers in Great Britain where the sun is not hot enough to ripen sufficiently the flowering wood. Here the trees flower only once in two years and, with few exceptions, all individuals planted in the northern states flower the same year. Although one of the handsomest trees that can be used for the decoration of parks and gardens in the eastern states, the *Virgilia* seems to be less commonly used here than it was seventy-five years ago. Fortunately it can still be obtained in a few American gardens.

Deutzia hypoglauca. This plant was not injured by the severe cold of the past winter and has now flowered for three years in the Arboretum. It is a tall vigorous shrub with erect, much branched stems, lanceolate, long-pointed leaves dark yellow-green on the upper surface and pale below, and light orange-brown branchlets. The pure white flowers are seven-eighths of an inch in diameter and are borne on slender drooping pedicels in many-flowered compound, round-topped clusters from three to four inches across. The broad, petal-like filaments, which are rather shorter than the spreading petals and are notched at the apex, form a tube rising from the center of the flower from which the bright yellow anthers emerge. *Deutzia hypoglauca* was discovered by Wilson in Hupeh but the plants in the Arboretum were raised here from seeds collected in 1910 by Purdom on the mountains of Shensi at altitudes between eight and ten thousand feet above the sea-level. This may prove a valuable plant to cross with some of the Chinese *Deutzias* with rose-colored flowers which are not really hardy in this climate. It is a handsomer plant than *D. parviflora*, another Chinese species and an old inhabitant of the Arboretum where it has proved to be one of the hardiest of all *Deutzias*. Sent by the Arboretum to Lemoine at Nancy, France, it was successfully crossed by him with *D. gracilis*. The result of this cross was *Deutzia Lemoinei*, one of the handsomest and hardiest garden shrubs of recent creation. One of the forms of *D. Lemoinei*, *Boule de Neige*, has been unusually full of flowers this year.

The Persian Yellow Rose. This Rose is just opening its flower-buds. It is the last of the yellow-flowered Roses which are hardy in the Arboretum and a few days later than the Harrison Rose. The Persian yellow Rose is a dwarfer plant of better habit than the Harrison Rose, and the flowers are larger and of better color; and when it succeeds it is the handsomest of the double-flowered yellow Roses. It is a form of *Rosa foetida*, a beautiful and too little known Rose of southern Russia, the Caucasus and Persia. The so-called Austrian Briar, with petals yellow on the outer surface and dark copper color on the inner surface, is believed to be a variety of *R. foetida* (var. *bicolor*). The Harrison Rose, which was raised in New York many years ago, is believed

to be a hybrid between the Scotch Rose and the Austrian Briar; it is very hardy, flowers freely every year and grows to a large size. Unless, however, it is cut back occasionally it becomes straggling in habit and unsightly. The yellow-flowered forms of the Scotch Rose, *R. spinosissima*, var. *hispida* and var. *luteola*, have been flowering well this year; they are handsome and hardy plants, and although the flowers soon drop their petals they are well worth a place in collections of single-flowered Roses. *R. spinosissima fulgida* with single delicate pink flowers is another variety of the Scotch Rose which has been covered with flowers during the past week.

A pink-flowered Locust. One of the most distinct and beautiful forms of the Locust-tree, *Robinia Pseudacacia* var. *Decaisneana*, has been unusually full of flowers during the past ten days. This tree, which first flowered in 1862 in the nursery of M. Villeveille at Manosque in southern France, differs from all the other forms of this Locust in its pale pink flowers. Many forms of the Locust have been raised in European nurseries; they are all handsome and hardy, and could they be protected from the borers which riddle the trunks and branches of all forms of the Locust they would be as highly esteemed here as they are in France and Germany. The variety *Decaisneana* must not be confounded with *R. viscosa*, an American tree with pink flowers in partly erect clusters, and well distinguished by the glandular viscid hairs on the branchlets and flower-clusters. This tree is also flowering in the Arboretum, as is the little Rose Acacia, *Acacia hispida*, a hispid shrub with large bright rose-colored handsome flowers, which is not known to produce seeds but spreads widely and rapidly by underground stems and may become a troublesome weed.

Viburnum cassinoides is blooming profusely but nearly three weeks before its usual time for flowering. In cultivation this *Viburnum* is a round-topped shrub from four to six feet high. The leaves are thick and lustrous, and differ greatly in size and shape. The flowers are slightly tinged with yellow and are borne in wide, slightly convex clusters which also vary greatly in size. This plant appears even more beautiful in the autumn than in June; for the fruit is larger than that of the other summer-flowering American *Viburnums*, and at first when fully grown is yellow-green, becoming pink and finally dark blue or nearly black and covered with a pale bloom, fruits of the three colors occurring together in the same cluster. This *Viburnum* has been generally planted in the Arboretum, and it is certainly one of the handsomest shrubs of eastern North America. Two other handsome American *Viburnums*, *V. bracteatum* and *V. molle*, are in bloom and are interesting to persons who like to see rare or little known plants. The former grows only on the cliffs of the Coosa River near Rome, Georgia, and the latter in southern Kentucky and very locally in southern Missouri.

ARNOLD ARBORETUM
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Philadelphus. Few plants give greater beauty to northern gardens than the Syringas or Mock Oranges. These are the unfortunate popular names of the different species of *Philadelphus*, for *Syringa* is the botanical name of the Lilac, and Mock Orange is the popular name of *Prunus caroliniana*, a southern evergreen Cherry which is much planted in the southern states as an ornamental tree and in making hedges. The species of *Philadelphus* grow naturally in southeastern Europe and the Caucasus, in the United States on the southern Appalachian Mountains, in western Texas, on the southern Rocky Mountains, and in the northwestern states, in Japan, Korea, northern and western China, and on the Himalayas. In the last twenty years much attention has been paid to the introduction of new species; artificial and natural hybrids, too, have increased the number of these plants, and there are now growing in the Arboretum some thirty species and a number of varieties and hybrids. The flowering period of the Syringas extends through six or seven weeks and, with few exceptions, none of them begin to bloom until that of most Lilacs and of the Bush Honeysuckles has passed. With its development in recent years *Philadelphus* has become one of the important groups of garden shrubs to be ranked with the Lilacs, Bush Honeysuckles, Viburnums and Azaleas. The species and hybrids of *Philadelphus* are nearly all hardy in Massachusetts but the white and usually fragrant flowers are their only attraction. They are not particularly interesting in habit; the foliage is dull; the leaves fall without change of color, and the fruit, which is a dry capsule, is smaller and not more attractive than that of the Lilac. All the Syringas flower freely nearly every year; they need rich, well-drained soil,

and the presence of lime in it has no bad effects on them. Better than most shrubs they can support shade and their ability to grow and flower under trees make them valuable as undergrowth in border plantations.

The Mock Orange of all old gardens is *Syringa coronarius*, the eastern European species. This plant was first cultivated in England before the end of the sixteenth century and was probably one of the first garden shrubs brought to America by the English settlers. It is a medium-sized shrub often as broad as high. The flowers, too, are of medium size and faintly tinged with yellow. This shrub has been somewhat neglected since so many species and hybrids with larger and showier flowers have found their way into gardens. This is unfortunate, for no other *Syringa* equals the old-fashioned Mock Orange in the delicate perfume of its flowers. Varieties of this plant with yellow leaves, with double flowers, and with narrow willow-like leaves can be seen in the Arboretum collection, but none of them have any particular decorative value. Among the American species which should find a place in all gardens are *P. inodorus*, *P. pubescens*, and *P. microphyllus*. The first is a native of the Appalachian Mountain region and grows to the height of six feet; it has arching branches and large, solitary, pure white, cup-shaped, scentless flowers. By some persons it is considered the most beautiful of all *Syringas*. *P. pubescens*, often called *P. grandiflorus* or *P. latifolia* is also a plant of the southern Appalachian region. It often grows to the height of twenty feet; the branches are stout and erect; the leaves are broad, and the slightly fragrant flowers are arranged in erect, from five- to ten-flowered racemes. This plant is more common in gardens than the last and when it is in bloom it makes a great show. *P. microphyllus*, which rarely grows more than three feet tall, has slender stems, and leaves and flowers smaller than those of any *Philadelphus* in cultivation. What the flowers lack in size, however, is made up in fragrance which is stronger than that of any other *Syringa* and perfumes the air for a long distance.

The most distinct and the handsomest of the Asiatic species in the Arboretum is *Philadelphus purpurascens*, discovered by Wilson in western China. It is a large shrub with long arching stems from which rise numerous branchlets from four to six inches long and spreading at right angles; on these branchlets the flowers are borne on drooping stalks; they are an inch and a half long, with a bright purple calyx and pure white petals which do not spread as they do on most of the species but form a bell-shaped corolla and are exceedingly fragrant. This is one of the handsomest of the shrubs brought from western China to the Arboretum. *Philadelphus Magdalenae* is another Chinese species well worth cultivation. It is a tall broad shrub with arching stems, small dark green leaves and pure white fragrant flowers an inch and a quarter in diameter and arranged in drooping, leafy, many-flowered clusters from six to ten inches in length. *Philadelphus pekinensis* from northern China and Mongolia is a stout bush rather broader than high which every year produces great quantities of small flowers tinged

with yellow. Another interesting garden plant, *P. Falconerii*, which is certainly Asiatic and probably Japanese, has narrow lanceolate leaves and fragrant flowers in from one- to six-flowered racemes, and is distinct in the shape of its leaves and in its long narrow petals. The origin and history of this plant is not known.

Hybrid Philadelphus. The first hybrid *Philadelphus* which attracted attention was raised in France before 1870 by a Monsieur Billard, and is sometimes called in gardens *Souvenir de Billard*, although the correct name for it is *Philadelphus insignis*. This hybrid is one of the handsomest of all the tall-growing *Syringas*, and its value is increased by the fact that it is one of the latest of them all to flower. In a few old gardens in the neighborhood of Boston great *Syringa* bushes occasionally thirty feet high and correspondingly broad are sometimes found. These plants are believed to be hybrids between *P. coronarius* and some unrecognized species. It is called *Philadelphus maximus*. Another hybrid, *P. magnificus*, sprang up in the Arboretum several years ago and is supposed to be a hybrid between two American species, *P. inodorus* and *P. pubescens*. It is a large and shapely shrub with pure white only slightly fragrant flowers an inch and three-quarters in diameter and borne in erect clusters. *Philadelphus splendens* flowers very freely and when the flowers are open it is the showiest plant in the *Syringa* Group.

Lemoine Hybrid Philadelphus. Several years ago the French plant breeder Lemoine crossed *P. coronarius* with the Rocky mountain *P. microphyllus* and obtained an entirely new race to which the general name of *P. Lemoinei* was given. The original bush is intermediate between the parents in size and in the size of the flowers. The flowers are pure white, very fragrant and produced in profusion. From this plant Lemoine raised many seedlings and secondary hybrids and these vary from the original *P. Lemoinei* in size and in the size and shape of the flowers. Taken as a whole the Lemoine hybrid *Syringas* form one of the most beautiful groups of garden plants that has been created by man. There are a number of these plants in the Arboretum collection and they have been considered perfectly hardy here, but last winter was too cold for some of them. *P. Lemoinei* itself and many of its varieties are uninjured, but a few of the second hybrids were killed to the ground but are now growing again from the roots. Unfortunately among the injured is the little plant called *Conquête* which is usually considered the handsomest of these Lemoine *Syringas*. This is the midseason for *Philadelphus*. The flowers of the Korean *P. Schneekii* var. *Jackii*, which are always the first to open, faded nearly two weeks ago, and the buds on some of the other species and hybrids will not open for nearly a month.

The Sour Gum or Tupelo (*Nyssa sylvatica*) is now in flower. The minute yellow-green flowers of this tree are hidden by the leaves and will only be seen by persons who are specially looking for them. In spite of its inconspicuous flowers the Sour Gum is one of the handsome trees of eastern North America where it grows from Maine to Florida and Texas. The greatest beauty of this tree is in its lustrous, dark

green leaves which in early autumn turn orange and scarlet, and then are not surpassed in brilliancy by the leaves of any other American tree. The bright blue shining fruits, which are about two-thirds of an inch long, are also ornamental. This tree varies greatly in habit. Near the coast it is low with a broad, flat or rounded had. Such trees are common on Cape Cod and near the northern shore of Long Island Sound. In the interior, and on the slopes of the southern Appalachian Mountains, where it grows to its largest size, it is often a hundred feet high, with a tall massive trunk four or five feet in diameter and a narrow head of erect branches. Few American trees are better worth cultivating for the ornament of parks, but no one in these days plants a Sour Gum. The long hard roots make it difficult to transplant, and only small seedlings can be successfully moved. Those persons who care only for "immediate effect," the slogan of Americans of the twentieth century who believe that money only is needed to secure fully grown trees, have little use for the Sour Gum which wisely rebels against the modern method of tree-planting which menaces the future of too many American country estates.

Cornus kousa. The flower-buds of this eastern Asiatic representative of our Flowering Dogwood were not injured by the winter which ruined those of the American tree, and the Japanese form of *Cornus kousa* is now in bloom. It is a small tree or large shrub and the white bracts which surround the clusters of flowers are smaller than those of our native tree and are pointed. The form from western China has rather larger flower-bracts than those of the Japanese plant. The fact that the flower-buds of the Asiatic tree have not been injured by the cold of the past winter adds to its value.

The Mountain Laurel (*Kalmia latifolia*) is in bloom. Occasionally more plants on the bank at the northern base of Hemlock Hill have flowered than are flowering this year, but the display is much better than it was a year ago, and the Arboretum Laurels are now well worth a visit. The Mountain Laurel is a remarkable plant. It can be seen in full bloom near the shores of Mississippi Sound during the first week of April, and travelling north one can see its flowers every day until early July when the northern limit of its range in New Brunswick and the northern shore of Lake Erie is reached. It grows as well in New England as it does in regions where the climate is less rigorous, but in New England the plants never grow to the size they attain on the Blue Ridge of North and South Carolina about the headwaters of the Savannah and Little Tennessee Rivers. Few plants have more beautiful flowers; and the Mountain Laurel is a broad-leaved evergreen, and broad-leaved evergreens which are hardy in Massachusetts, with the exception of a few low under shrubs, can be almost counted on the fingers of one hand. For of these plants only the *Kalmia latifolia*, *Rhododendron catawbiense*, *R. maximum* and *Andromeda floribunda* can be absolutely depended on. A few more Rhododendrons might be added to the list, but after the experience of recent years it is not safe to say that any foreign species or any hybrid Rhododendron will prove hardy under all the weather conditions Massachusetts may experience.

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Populus Maximowiczii. This tree is a native of eastern Siberia, eastern Saghalin and northern Japan. It is the largest tree of eastern Siberia where it sometimes grows eighty feet high with a trunk six feet in diameter and a broad head of massive spreading branches. On young trees the bark of the trunk is smooth and pale brown, but on old trees it becomes thick and furrowed. This Poplar was first sent to the Arboretum from Petrograd in 1878 but its distinctive characters were not recognized until some years later. The plants now in the Arboretum were propagated from the Petrograd tree which disappeared when the Poplar Collection was rearranged on the southern slope of Bussey Hill. They are now twenty years old and about thirty-five feet high. They have never been attacked by borers which make the cultivation of the Balsam Poplars and some of the Cottonwoods so difficult and unsatisfactory, and their leaves apparently have no attraction for leaf-eating caterpillars. The leaves are green and lustrous on the upper surface, silvery white below, three or four inches long, and two or two and a half inches wide. The fruit, which is fully grown in May, unlike that of other Poplars, remains on the trees here until September without opening.

Native and Foreign Trees. *Populus Maximowiczii* is not only the handsomest and most satisfactory tree in the Poplar Collection but it is one of the few large exotic trees with deciduous leaves which can be recommended for general planting in the northern states. For the list of such trees is a short one. It includes the Ginkgo, which stands alone in its class and is one of the great trees of the world. The only sur-

vivor of a race which was once widely spread over the northern hemisphere, this inhabitant of eastern continental Asia is long-lived and able to support extremes of heat and cold, and to grow equally well in Massachusetts, Georgia and California. The Ginkgo is appreciated and has been largely planted in the city of Washington, but in other parts of the United States the beauty of this tree when it gets beyond its juvenile habit is not understood. *Pseudolarix* is another Chinese tree which is alone in its class and, although discovered only seventy years ago, it has been long enough in this country to show that it is perfectly able to adapt itself to the Massachusetts climate. This is surprising for the home of *Pseudolarix* is on low mountain slopes not far from the coast and south of the Yangtze River. The European Larch, although less picturesque than the Larch of northeastern North America, is a larger and more valuable tree, and the experience with it in New England shows that it is a tree which can be depended on to grow here rapidly to a large size.

The two Silver Poplars of Europe (*Populus alba* and *P. canescens*) flourish in the United States where they have grown to a large size and are as much at home as they are in their native countries. The pale color of the foliage of these trees is unlike that of any of the American species, and their hardiness and vitality make them useful for planting in exposed positions. The Silver Poplar of northern China (*P. tomentosa*) is one of the handsomest of all Poplar-trees. It has grown well in the Arboretum but it is too soon to form an opinion of its value in this country. Two European Willows, *Salix alba* and *S. fragilis*, and some of their varieties, have become completely naturalized in the northeastern states where they grow as large or even larger than in Europe and are important additions to the North American silva. The Chinese Weeping Willow (*S. babylonica*) is not always perfectly hardy in Massachusetts, but further south is valued as an ornamental tree. The so-called Wisconsin Willow, a natural hybrid between this Chinese Willow and *S. alba*, and other hybrids of the same parentage are useful ornamental trees in the northern states.

Cercidiphyllum is the largest deciduous-leaved tree of Japan, and although it was introduced into the United States only forty years ago it gives promise of becoming a permanent addition to the trees of the largest size which can be successfully grown here. The Chinese White Mulberry (*Morus alba*) is a larger and hardier tree than the Mulberry-tree of the eastern states, and is perfectly at home here. Probably the most generally useful, however, of the large deciduous-leaved trees which have been brought into the northern states is the Ailanthus of northern China which must have been growing here for nearly a century. It grows rapidly and is perfectly hardy, and it can resist the heat, drought and dryness which trees have to suffer in our cities better than any other tree with the exception, perhaps, of some of the Poplars. The Ailanthus, too, produces handsome wood valuable in cabinet-making.

The Japanese White Oaks are handsome trees and produce valuable timber. They grow well in the Arboretum and give every promise of

living here for many years. Under the most favorable conditions in Japan they do not become as large as our native White and Bur Oaks, and do not produce more valuable timber than these and several other American White Oaks. All foreign Oaks which can be induced to live here are proper inhabitants of the Arboretum where they are needed for study and public display, but for general planting the Oaks of other countries will never be used in New England in preference to the native species. Of all the Elm-trees of the world not one equals in grace and beauty the White Elm of eastern North America (*Ulmus americana*). It is a true lover of the country, however, and only shows its greatest beauty in the deep moist soil of a New England intervale. Moved to the city it soon languishes, for it resents city conditions of overdrained soil, smoke and bad air. One of the so-called English Elms is better able to thrive in cities where the American Elm fails, and in Boston and its suburbs the English tree has been growing for more than a century and has proved itself valuable. None of the exotic Ash-trees are really valuable here. For general planting in the eastern United States no Ash is as good as the American White Ash (*Fraxinus americana*) for the decoration of parks and roadsides and the production of timber. The European Ash (*Fraxinus excelsior*), which is a magnificent tree in some parts of Europe, is a miserable failure here, and the great Ash-tree of northeastern continental Asia and northern Japan (*F. mandshurica*) can barely be kept alive in New England. European Birch-trees grew well in the northern states until they were attacked by a borer which destroyed them by thousands. The slender drooping branches of *Betula pendula* make it an interesting and attractive object but it is not as handsome a tree as the native Canoe Birch (*Betula papyrifera*) which is the handsomest of the white-barked Birches and in one of its forms exceeds all other Birch-trees in size. *Betula Maximowiczii* with pinkish bark, and a native of northern Japan, is, however, a handsomer tree than the Canoe Birch. It has been growing in this country for twenty-five years, and although it has grown well and is perfectly hardy here it is too soon to speak of its permanent value.

The pale gray bark of the trunk and branches of the American Beech makes it in winter the most beautiful of all Beech-trees, but as a planted tree it does not behave as well or grow as rapidly as the European Beech which, in spite of its darker colored bark, is a better tree for the decoration of our parks. The northern Linden (*Tilia glabra* or *americana*) is a noble tree in the northern forests where in deep moist soil it sometimes grows to the height of one hundred and thirty feet and makes a trunk four or five feet in diameter, but it does not take kindly to cultivation in a climate as warm as that of Massachusetts. Planted trees grow slowly here; the leaves are usually disfigured by red spiders and turn brown and fall during the summer. There are a number of Linden-trees in the middle and southern states but little is yet known about them as cultivated trees, and a planter who wants Linden-trees had best use some of the European species. There are five of these, and the three species of western Europe have been so thoroughly tested in the United States that it is possible to say that

they are among the most valuable trees which have been brought here from foreign countries. The most satisfactory of them here is *Tilia vulgaris*, a widely distributed but rather rare tree in Europe and believed to be a natural hybrid between the other western European species *T. platyphyllos* and *T. cordata*. There are large specimens of this Linden in the suburbs of Boston. No American Horsechestnut or Buckeye can compare in size or in the beauty of its flowers with the species of southwestern Europe (*Aesculus Hippocastanum*), which is well known to many Americans who have never heard that there were Horsechestnut-trees growing naturally in the United States. The European Horsechestnut is another of the great trees of the world. It is as much at home here and grows to as large a size as it does in western Europe. Few trees have more conspicuous flowers or foliage of deeper green. It thrives, however, only in deep rich soil and usually resents city conditions. In some old gardens in Salem, however, there are as noble Horsechestnuts as can be found in the United States or Great Britain. It is a miserable street tree, as can be seen in Paris, where the leaves turn brown and fall by midsummer, and in New York and Boston where fortunately it has not been generally planted. Among the Maples of large size which have been planted in the eastern states only the so-called Norway Maple (*Acer platanoides*) has shown real power to flourish here. It is a smaller and less beautiful tree than the native Sugar Maple, but the Sugar Maple, too, resents city conditions and objects to living at the seashore, and as the Norway Maple has proved a valuable tree for city and seashore planting it must be considered one of the really valuable foreign trees introduced into this country. The Old World Walnut-tree (*Juglans regia*) sometimes called English Walnut or Persian Walnut, although it is a native of China, is a handsomer and more valuable tree than any of the American Walnut-trees, but unfortunately it is only doubtfully hardy in the northeastern states and will probably never grow to a large size here or produce the great crops of nuts and the timber which make this such a useful tree in many parts of the world. Chestnut-trees (*Castanea*) are fast disappearing from the United States as the Chestnut-tree disease spreads, and there is now little interest in drawing a comparison between the American and foreign species. The European Chestnut is not hardy in Massachusetts. The Japanese Chestnut is a small tree of no great value, and the Chinese *Castanea mollissima*, which it is hoped may prove resistant to the disease, has only been in the country for fifteen years. It has proved hardy in the Arboretum and produces a little fruit here.

It appears therefore from the experience gained in Massachusetts during about a century that only the following deciduous-leaved trees of large size have proved themselves to be worth general planting in the northeastern states for ornament or timber:— the Gingko, the Pseudolarix, the European Larch, three species of Poplar, three Willows and their hybrids, the Cercidiphyllum, the White Mulberry, the Ailanthus, the European Beech, the English Elm, one Birch, three Lindens, the European Horsechestnut, and the Norway Maple, twenty in all. At the end of another century the record of the Arboretum will, it is to be hoped, be able to tell a story of greater successes.

ARNOLD ARBORETUM
HARVARD UNIVERSITYBULLETIN
OF
POPULAR INFORMATION

JAMAICA PLAIN, MASS.

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The English Elm. In the discussions of the English Elm which occasionally appear in the Boston papers surprise is expressed that different individuals of this tree differ in general appearance and in the size of the leaves, showing perhaps that it is not generally known that there are four distinct species of Elm-trees now growing naturally in England. This confusion in regard to these trees is of long standing, for Linnaeus one hundred and sixty-five years ago believed that all the Elm-trees of Europe were of one kind to which he gave the name of *Ulmus campestris*, a name which must be abandoned as the four British trees and an Elm-tree of northern and eastern Europe are included in his description.

Ulmus procera. This is the name now adopted for the tree which is generally known as English Elm in Boston where it has proved one of the best foreign trees ever planted in Massachusetts. It has been growing here for more than a century, and nearly one hundred years ago Major Paddock had a nursery at Milton for the propagation and sale of this tree. Probably no tree, native or foreign, which has been planted in the neighborhood of Boston has grown to such a large size. The Paddock Elms, which stood on Tremont Street in front of the Granary Burying Ground, were of this species, as were the great Elms on the Tremont Street Mall of the Common which were killed by the Subway. The Elm-trees on each side of the Shaw Monument opposite the State House are of this species, and there are still large specimens in the suburbs of the city. This is the common Elm-tree of southern England where it grows usually in hedge-rows, although it

has been largely planted in parks. It often grows one hundred feet tall with a massive stem covered with dark deeply furrowed bark, spreading or ascending branches which form a comparatively narrow oval head, and slender branchlets thickly covered during their first year with down. The leaves are broadly oval or ovate, oblique at the base, dark green and rough on the upper surface and covered below with soft down; they are from two to three inches long with about twelve pairs of veins, and their stalks are only about one-fifth of an inch in length. This tree very rarely ripens fertile seeds in England or in this country, but it produces suckers in great numbers and is propagated entirely by means of these. As this tree so rarely produces seeds few varieties are known, but a small-leaved Elm (var. *viminalis*) is believed to be a seedling of it. Of this little Elm there are forms on which the leaves are blotched with white and with yellow.

Ulmus foliacea, or nitens. This is another English Elm which differs from the last in its paler bark, in its smooth or nearly smooth branchlets, that is without a covering of down and in its leaves which are smooth and shining on the upper surface, only slightly downy below early in the season and from two to three and a half inches long. This tree produces fertile seeds in abundance and seedlings are raised in European nurseries. It is widely distributed over central and southern Europe and grows also in northern Africa and eastern Asia. Several geographical forms are recognized; the most distinct of these are the Cornish and the Guernsey Elms which are trees of medium size with erect growing branches which form a narrow pyramidal head. Plants of these two forms are not always hardy in Massachusetts. Another form, common in Hertfordshire, is a large tree with wide-spreading and pendulous branches and at its best, although not so tall, is almost as handsome as our American White Elm (*U. americana*). Another form (var. *umbraculifera*) from Persia and Armenia is interesting from its compact globose head. This tree might perhaps be made useful in formal gardens. On many trees of *Ulmus foliacea* the branches are furnished with corky wings (var. *suberosa*), and the so-called English Elms with such branchlets occasionally seen in this country are usually of this variety. The seedling trees of this Elm which have been imported from European nurseries vary in habit, in the size of their leaves and in their hardiness; and the unhealthy and generally unsatisfactory Elm-trees which have been planted in considerable numbers in eastern Massachusetts during the last twenty years are in nine cases out of ten seedling forms of *U. foliacea*.

Ulmus glabra. This is another widely distributed European Elm which is often called Scotch Elm or Wych Elm by English-speaking people. This is a tree with a trunk and branches which remain smooth for many years. It can always be recognized, too, by the large obtuse buds covered by pale brown hairs and by its dark dull green leaves abruptly pointed or three-lobed at the apex, oblique and unsymmetrical at the base, rough above, downy below and from four to six inches long with stalks shorter than those of other Elm-trees. This tree does not sucker but produces fertile seeds in great quantities, and more abnormal seedling forms of this tree have been raised

than of any other Elm. The well-known Camperdown Elm is a form of this tree with regularly pendulous branches which is often planted in suburban gardens to make natural arbors; another form (var. *pendula*) has horizontally spreading pendulous branches which form an unsymmetrical, flat-topped head. There is a form with erect branches forming a narrow pyramidal head and others with leaves more coarsely toothed than those of the ordinary form and with purple and other abnormal leaves. This is perhaps the least beautiful of all the species of Elms. The abundant seeds are blown great distances and germinate so readily that seedlings are often troublesome weeds which if neglected for a few years become difficult to eradicate. For several years the leaves of this tree in the neighborhood of Boston have been turned brown and often killed by a leaf-mining insect which attacks this species but no other Elm-tree.

Ulmus minor, sometimes called *U. sativa*, is a small-leaved Elm-tree of large size which is rather closely related to *U. foliacea*. Although common in the eastern counties of England, it is possible that this tree cannot be seen in the United States outside of the Arboretum.

Ulmus hollandica. This general name has been given to a race of natural hybrids between *U. foliacea* and *U. glabra*, among which are some of the handsomest and most valuable of the European Elms. To the best known in this country of these hybrids the name *Ulmus hollandica vegeta* has been given. This tree was raised in a nursery at Huntingdon about the middle of the eighteenth century and is usually called the Huntingdon Elm. This tree often grows one hundred feet high with a massive trunk and spreading and ascending branches which make a vase-shaped head which readily distinguishes this tree from other Elms. It can be seen to good advantage in Cambridgeshire, England, especially in Cambridge, where there is a noble avenue of the Huntingdon Elm. A tree of this hybrid which grew in the grounds of Magdalen College at Oxford was believed to be the largest tree in Great Britain. In April, 1911, this tree was blown down and was found to be one hundred and forty-two feet high with a trunk twenty-seven feet in circumference at five feet above the ground. In this country this hybrid Elm grows more rapidly than other Elm-trees, and as it produces suckers it can be easily multiplied. It is not common here, however, although in the neighborhood of Boston specimens not more than sixty years old have already grown to a large size. The var. *belgica* of this hybrid is the Elm which has been most often planted as a street and roadside tree in Belgium and Holland. It is a tall tree with a straight, rough-barked trunk, a broad head of rather erect branches, and dark green leaves slightly roughened above and covered below with soft down. As this tree grows in Holland it is one of the handsomest and most desirable trees for shading city streets. This Elm appears to be little known in the United States; it is growing well in the Arboretum, but it has not been here long enough yet to show if it will be of permanent value in New England. The so-called Dutch Elm, *Ulmus major* of many English dendrologists and a common tree in English parks, is probably another hybrid of the same parentage (*U. hollandica* var. *major*). This is a very large tree with

a short trunk covered with rough bark, wide-spreading branches furnished with corky wings, and dark green leaves lustrous and nearly smooth on the upper surface and slightly downy below. As this tree produces many suckers it can be easily multiplied.

Ulmus laevis. This is a common Elm in northern Russia and in some parts of Scandnavia, and occurs occasionally in Denmark and the Balkan countries. It has been growing in the Arboretum since 1888, and is now fifty-five feet tall with a short trunk, a broad pyramidal head and dark green foliage. Botanically this Elm is closely related to the American White Elm (*Ulmus americana*) but differs from it in the thicker coat of down on the lower surface of the leaves and in its larger and sharper-pointed buds. The leaves of this tree unfold here earlier than those of any other Elm. It is probably extremely rare in the United States, but American tree lovers can wisely learn more about it.

The Arboretum Collection now contains sixty-two different Elms and includes all the known species with the exception of the four Himalayan Elms and the Mexican Elm which are not in cultivation and two species from the southern United States which are not hardy here. With few exceptions the important and interesting varieties and hybrids are represented in the collection. Many of the plants are still too small to produce fruit or to show the habit of mature trees, but as a whole the collection offers a good opportunity for the study of the leaves and branchlets of Elm-trees.

A good Rhododendron. To a Rhododendron which is growing in Mr. Hunnewell's garden at Wellesley the name of Glennyi has been given. This name is probably not correct, at least it is not found in the catalogues of garden Rhododendrons. There was once, however, in England a Mr. Glenny who raised hybrid Rhododendrons, for on the 5th of February, 1838, at a meeting of the Royal Horticultural Society in London, "Mr. George Glenny exhibited a Rhododendron said to have been raised by himself from seed. It did not appear different from a variety raised some years since by Mr. Waterer, of Knaphill, and called in the gardens *R. pulcherrimum*. It is said to have been a hybrid between *R. arboreum* and *R. caucasicum*, and was raised at Knaphill in 1832; it has pink flowers." The plant in Mr. Hunnewell's garden is evidently a hybrid of *R. caucasicum*, and has been growing there for fully fifty years. The original specimens were certainly imported from England and are now round-topped bushes about six feet high. For at least thirty years they have never suffered from heat or cold and have never failed to bloom freely. The leaves show the influence of *R. catawbiense* but the size of the flower-clusters and the size of the white flowers, which are a good deal like those of *R. Boule de Neige*, point to *R. caucasicum*. The early flowers, for this is one of the earliest of the hardy Rhododendrons to flower in this climate, show too the *caucasicum* influence. But whatever name it should bear and whatever its parentage this Rhododendron is a valuable plant, for it is certainly one of the hardiest hybrid Rhododendrons which have been planted in this country. There are only small plants in the Arboretum Collection where it has not yet flowered.

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Summer-flowering Trees. Several interesting trees will flower in the Arboretum at different times during the next two months. Among these summer-flowering trees are the Chinese *Sophora japonica*, the Maackia of eastern Siberia, *Acanthopanax ricinifolius* from northern Japan, the arborescent Aralias from the southern United States and eastern Asia, the Korean and Chinese Evodias, the Sour Wood or Oxydendrum from our Southern States, the Chinese Koelreuteria and one of the American Catalpas (*C. bignonioides*). It is interesting that only three of these trees, one of the Aralias, the Sour Wood and the Catalpa are American, and that the others have been brought to this country from eastern Asia. The most important group, however, of summer-flowering trees is

The Lindens. The flowers of a few of the early flowering species of these trees, like the European *Tilia platyphyllos* and its varieties, and *T. vulgaris*, and the American *T. neglecta*, are already open; and during the next two or three weeks the flowers of different species of Linden-trees will open in the Arboretum and attract the bees to their richest harvest. Linden-trees are very generally distributed in all the temperate regions of the northern hemisphere with the exception of western North America and, in addition to numerous species, several hybrids are cultivated. All the species are very similar in flower and fruit, and chiefly vary in the size and shape of the leaves, in the presence or absence of hairs on the leaves and branchlets, and in the nature of their hairy covering when it occurs. A fact which is not easy to explain is the presence in the flowers of all the American species of

petal-like scales opposite the petals and connected with the clusters of stamens, while in the flowers of all the Old World Lindens such scales do not exist. Another fact about Lindens which is not easy to explain is that the European species grow much better in Massachusetts than the species of eastern Asia, although as a rule European trees do not succeed here as well as the trees of eastern Asia. The five European Lindens and the species from the Caucasus all flourish in the Arboretum and some of these trees have grown in New England to a large size. The Asiatic species, however, although they have not been many years in this country, give little promise of becoming really good trees here. *Tilia japonica*, which has been growing in the Arboretum for twenty-five years, although still a small tree, is, however, perfectly healthy; it is related to the small-leaved Linden of Europe (*T. cordata*) and, like that tree, is one of the latest Lindens to flower here. The graceful drooping branches and pale under surface of the leaves make this small tree attractive, and it is the first of the Lindens here to unfold its leaves in the spring. The common Linden of the north (*T. glabra* or *americana*) as was recently explained in one of these Bulletins, is not as good a tree here as several of the European species, but there are several other American Lindens which have been overlooked by American planters, and misunderstood or neglected by American botanists, and among them are handsome trees. Some of these are growing in the Arboretum, and it is not improbable that the Arboretum collection will be improved at the end of a few years when it is hoped the American Lindens will be better known.

Lindens have always been more valued as ornamental and shade trees in Europe than in the United States. No other trees have been more generally planted in some of the countries of central Europe, and in these countries attention has been paid to the collection and perpetuation of several interesting and valuable varieties and hybrids. The Arboretum collection, which is arranged in the meadow on the right-hand side of the Meadow Road, now contains forty-five species, varieties and hybrids. Many of these trees have flowered for several years, and some of them are large enough to show the habit of the different species when thirty or forty years old. Judging by the Arboretum collection, the handsomest of these trees which can be grown in this part of the country are the European *T. vulgaris*, *T. cordata*, *T. tomentosa*, and *T. petiolaris* and the American *T. heterophylla*, *T. Michauxii* and *T. neglecta*, and the hybrid *T. spectabilis*. This tree is believed to be a hybrid of *T. americana* with *T. petiolaris* or *T. tomentosa*. It has leaves as large as those of the American tree but silvery white on the lower surface. The variety *Moltkei* has rather thicker but equally large leaves. These trees are among the handsomest of all Lindens, and no Lindens in the Arboretum collection grow more rapidly.

Some good shrubs. A correspondent asks the Bulletin to name the twelve best shrubs of recent introduction. The task is not an easy one for two persons rarely agree in their opinion of the merits of any plant for any particular purpose. The best shrubs in the sense which our correspondent means are those which will be hardy over a large

part of New England and the middle and middle western states, that is in those parts of eastern North America where gardening is most practiced. This means that Rhododendrons, Azaleas and other plants of the Heath Family must be excluded from the list, for plants of this family will not grow in soil impregnated with lime. The selection is more difficult now than it would have been a year ago, for the past winter has hurt some of the shrubs which might have been included in such a list but which have not been able to support the excessive cold to be expected occasionally in the northeastern states. As they were uninjured by the cold of last winter the following twelve shrubs may at least be considered hardy whether all our readers approve or not of our selection. In our opinion four of the Cotoneasters of western China must be included in any list of the twelve best shrubs of recent introduction; they are *C. hupehensis*, *C. multiflora* var. *calocarpa*, *C. racemiflora* var. *soongorica*, and *C. nitens*. *C. hupehensis* is a broad, tall and shapely shrub with bright green leaves and white flowers which make the plant as conspicuous as any Spiraea. The flowers are followed by small scarlet fruits which are a good deal hidden by the leaves. *C. multiflora* var. *calocarpa* is a large shrub with slender, gracefully arching stems, and blue-green leaves. The flowers are borne in erect clusters on short lateral branchlets which rise above the arching stems, and few shrubs are more graceful in habit or more charming in the arrangement of their flowers; the fruit is scarlet and about a quarter of an inch in diameter. *C. racemiflora* var. *soongorica* is also a large and vigorous shrub with arching stems. The flowers are white and a little larger than those of *C. hupehensis*; the leaves are dull blue-green in color, and the fruit is large and showy. Many persons consider this the handsomest of the Chinese Cotoneasters. *C. nitens* is also a large broad shrub; the leaves are dark green and very lustrous; the flowers are red, and the fruit is black. Of these four Cotoneasters the last has the handsomest foliage but the smallest flowers and fruit.

Two Roses can properly find a place in this list of twelve shrubs, the Chinese *Rosa Hugonis* and the Korean *R. Jackii*. The former has pale yellow flowers and has often been described in these Bulletins; it is one of the handsomest of all single-flowering Roses and one of the most important introductions of recent years. *Rosa Jackii* bears clusters of white flowers like those of *R. multiflora*, but the flowers are nearly twice as large and open two or three weeks later. This is one of the last of the Roses to flower here and is now in bloom in the Shrub Collection.

Two Lilacs recently described in these Bulletins, can be included in the list, *Syringa Sweginzowii* from northern China and *S. reflexa* from western China. *Diervilla florida* var. *venusta*, introduced a few years ago from Korea, is perfectly hardy and the handsomest of all the species, varieties and hybrids of *Diervilla* in the large Arboretum collection. It can fairly be considered one of the best shrubs introduced into this country by the Arboretum in recent years. *Prinsepia sinensis* from northern China properly finds a place in this list. It is perfectly hardy; the leaves unfold earlier in the spring than those of any other

shrub in the Arboretum and are soon followed every year by innumerable yellow flowers. The hardiness, rapid growth, sturdiness and the abundant spines on the stems should make this a good hedge plant.

Of the numerous species of the genus *Corylopsis* cultivated in the Arboretum only the Japanese *C. Gotoana* escaped serious injury last winter. Like all the species of this genus, it bears drooping clusters of yellow flowers which appear before the leaves, which resemble those of the Witch Hazel to which *Corylopsis* is related. This beautiful shrub has flowered here now for several years and has shown itself worthy of a place among the best plants of recent introduction.

The list can be completed with *Aesculus georgiana* and *Spiraea Veitchii*. The former is a dwarf Buckeye from central Georgia, with compact clusters of large red and yellow flowers. This shrub was introduced into gardens by the Arboretum and has now flowered here for several years. As it was not injured by the cold of last winter it can probably be considered hardy in Massachusetts. *Spiraea Veitchii* is one of the plants discovered by Wilson in western China. It is a large shrub sometimes ten or twelve feet high, with gracefully arching stems above which the wide clusters of white flowers stand at the ends of short lateral branchlets. It is one of the latest of the white-flowered *Spiraeas* to bloom and is now in flower in the Arboretum where it has proved entirely hardy.

The fruits of *Acer tataricum* are already bright red and make this little tree a conspicuous and attractive object. The bright blue fruits of *Lonicera coerulea* and its numerous geographical varieties, and the scarlet, red and yellow fruits of the Tartarian Honeysuckle and its varieties and hybrids are now ripe. And from now until March persons interested in the handsome fruits of trees and shrubs can find them in great variety in the Arboretum.

With this issue these Bulletins will now be discontinued until the autumn.

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JAMAICA PLAIN, MASS.

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Crabapples in Autumn. The beauty of the Crabapples of North America and eastern Asia in spring when they are covered with their pink, rose color or white flowers has often been described in these Bulletins. That few trees produce handsomer or more abundant fruit is perhaps not yet generally known or the value of these trees for the decoration of the autumn garden fully appreciated. All the Crabapples, including the species from Florida and Oregon, are hardy in the north. They are all indifferent to the presence of lime in the soil and therefore can be grown successfully in parts of the United States where it is impossible to cultivate many plants like Rhododendrons and Azaleas to which the presence of lime is fatal. Of the large groups of shrubs and small trees of general and wide cultivation in this country—Lilacs, Syringas, Crabapples, Viburnums, Hawthorns, and Cornels—none equal the Hawthorns and Crabapples in the size and brilliancy of their fruit. The fruit of the American Crabapple is larger than that of the Asiatic species, depressed-globose except in the Oregon species, light green or pale yellow, covered with a waxy exudation, and very fragrant. The fruit of the Asiatic species is red, yellow with a red cheek or greenish, and varies in size from that of a small pea to a diameter of an inch and a half. On some species the fruit falls as soon as it is ripe and on others it persists until spring. There are many natural hybrids of these Asiatic plants and, as is the case in several other genera, the hybrids are often more valuable as garden

plants than their parents; and as all Apples hybridize very freely it is probable that large sowings of the seeds of the plants gathered in a collection like that of the Arboretum, which contains all the species and many varieties and hybrids, will yield forms of greater value as garden plants than those now known.

It is hard to say which is the handsomest of the Asiatic Crabapples at this season of the year. The showiest fruit is perhaps that of *Malus prunifolia*. This tree has been considered a native of Siberia and northern China, but although it has been known in western gardens for more than one hundred and fifty years its home as a wild tree is not yet known. It is evidently one of the rarest Crabapples in American gardens. The fruit is oblong, broader at the base than at the apex, nearly an inch and a half in length, very lustrous, bright red, or yellow with a red cheek. It differs from many of the other Asiatic Crabapples in the large, persistent, erect calyx. In this country at least the fruit is less abundant than that of many other species. The Rinki Crab, which is now believed to be a variety of *Malus prunifolia*, produces large crops of fruit in the Arboretum; this is smaller than the fruit of *M. prunifolia* and is often nearly globose, red, yellow or green on different trees. The Rinki is a native of northern and western China, and for many centuries has been cultivated by the Chinese as a fruit tree. From China it was early carried to Japan where it was generally cultivated for its fruit until replaced by the American and European apples of larger size and better quality. The handsome and abundant fruit of the Rinki should secure for it a place in American gardens.

Among hybrids of *Malus prunifolia* with other species, principally with the Siberian *M. baccata*, are plants which are conspicuous in the abundance and beauty of their fruit which, although somewhat smaller than that of *M. prunifolia*, is equally brilliant in color. This hybrid, which is still without a name, is well worth attention. Plants of *M. floridana* are unusually full of fruit this year which on some trees almost hides the leaves, giving the plant the appearance of fountains of old gold. The fruit on different plants varies somewhat in color and in size; from some it drops in the autumn as soon as it is ripe, and on other trees it remains until spring. Such trees furnish birds with great quantities of appreciated winter food. From many points of view this Crabapple is one of the very best large shrubs or small trees which can be grown in the northern United States. It is perfectly hardy and of excellent habit; for forty years it has never failed to cover itself with flowers which, bright rose color in the bud, are white after the buds have opened; and there have not been many autumns when the fruit has not been as abundant as it is this year. *Malus Arnoldiana*, a natural hybrid of *M. floridana* with some other species, originated in the Arboretum. It has the habit of *M. floridana* but the flowers and fruits are nearly twice as large. Some persons consider this hybrid the handsomest of the Crabapples and there are certainly no more beautiful objects in the Arboretum this Autumn. The different forms of the Japanese *Malus Sieboldiana* are all hand-

some in the autumn. The typical form is a low shrub broader than high with arching stems, and there is an arborescent form of excellent habit. This Crab produces great quantities of fruit which is not larger than a small pea and is bright red on some individuals and yellow on others. It has the merit of flowering later than the other Asiatic Crabapples. The variety *calocarpa* of *M. Sieboldiana* has larger flowers and fruit, and is a large arborescent shrub. As a flowering plant and when its bright red lustrous fruit is ripe it is one of the handsomest Crabapples. To Dr. William S. Bigelow of Boston, who sent the seeds to the Arboretum from Japan, western gardens owe this beautiful plant which is not known in a wild state. The small globose fruit of *M. baccata*, a common tree in northeastern Asia, varies considerably in size and in its shades of red, but all the forms are shapely trees handsome in spring and autumn. A Korean variety, var. *Jackii*, still rare in gardens, has perhaps the most brilliant fruit of any of the forms of *M. baccata*. A northern form, var. *mandshurica*, has larger fruit, and the flowers are more fragrant than those of any other Asiatic Crabapple. Attention may be called again to the value of *Malus Sargentii* as an autumn and winter plant. This is a shrub from northern Japan which grows only a few feet high but spreads by semiprostrate stems to a wide diameter. The scarlet fruit, which is produced in great quantities, is not apparently appreciated by birds and remains in good condition on the branches till spring. *M. transitoria* from western China has produced fruit in the Arboretum this year for the second time. It is ellipsoidal in shape, rose pink, darker on one side than on the other, very lustrous and about three-quarters of an inch long. The fruit of few Crabapples is more distinct and beautiful. Only a few plants in the Collection are mentioned in this Bulletin. Many others are equally interesting, and a study of the group will show possibilities for garden decoration which few persons in this country realize. In planting Crabapples it is well to remember that they only really thrive in rich, well-drained soil, that they require plenty of room in which to display their greatest beauty, that they are often attacked by the San Jose Scale which is easily controlled by spraying, and that their leaves are preyed on by the caterpillars which feed on the leaves of the Apple-trees of orchards.

Autumn Flowers. A few flowers can still be seen in the Arboretum, although the number of trees and shrubs which bloom in Massachusetts during the first weeks of October is not large. *Aralia spinosa*, the Hercules' Club of the middle and southern states, is still covered with its great terminal clusters of white flowers. These great flower-clusters and its compound leaves three or four feet in length give this tree an unusual and tropical appearance in northern woods. This *Aralia* is now well established in the Arboretum at the northern base of Hemlock Hill in the rear of the Laurels where it is spreading into thickets. *Indigofera amblyantha*, discovered by Wilson in western China, has been often referred to in these Bulletins, but it is interesting to note that it is still covered with its small rose pink flowers

which have been opening during the last three months. *Laspedeza formosa*, also collected by Wilson in western China, is the handsomest of the late Autumn-flowering shrubs in the Arboretum. Its arching stems, light green leaves, and innumerable small pea-shaped rose-colored flowers, make it a beautiful object at this season of the year. Often confounded with other species and burdened with an almost hopeless load of synonyms, *Indigofera formosa* appears to be little known in gardens.

Autumn Foliage. The Autumn change of color in the trees and shrubs is later this year than usual and, owing to the dry summer, will probably be less brilliant than usual. As a general rule the bright colors appear earlier in the autumn on American than on allied Asiatic plants, but there are exceptions, of course, to this phenomenon; and the three plants in the Arboretum which have been most brilliant during the last week are *Acer ginnala*, *Evonymus alatus*, and *Rhododendron (Azalea) japonicum*. The Maple is a small, shrubby tree, sometimes thirty or forty feet high with pointed, deeply divided leaves, and compact clusters of fragrant flowers. A native of eastern Siberia, where it is common in the neighborhood of Vladivostok, it was one of the first Siberian plants introduced into the Arboretum from whence it came from St. Petersburg. The leaves of no American tree assume more brilliant tones, but this brilliancy lasts only for a few days for the leaves fall early. *Evonymus alatus* from Japan is without a rival in the brilliancy of the deep rose color passing to scarlet of its autumn foliage. The habit of this shrub is excellent when it has an opportunity to spread out in the sun but the flowers and fruits are inconspicuous. The value of this Burning Bush as a decorative plant is now appreciated and it is found in many American nurseries, but it must not be forgotten that it requires a large space in which to develop its greatest beauty. A form of this shrub raised from seeds collected in Korea by Mr. Jack is handsomer even than the Japanese form with its larger fruit and even more brilliant autumn foliage. In their autumn color of old gold the leaves of *Rhododendron japonicum* are more beautiful than those of any of the Azaleas in the Collection, and this autumn color greatly adds to the ornamental value of this shrub which when in flower is the handsomest of the Asiatic Azaleas which are hardy in this climate.

An illustrated guide to the Arboretum containing a map showing the position of the different groups of plants has been published. It will be found useful to persons unfamiliar with the Arboretum. Copies of this guide can be obtained at the Administration Building in the Arboretum, from the Secretary of the Massachusetts Horticultural Society, 300 Massachusetts Avenue, Boston, from The Houghton, Mifflin Company, 4 Park Street, Boston, and at the office of the Harvard Alumni Bulletin, 18 Plympton Street, Cambridge. Price, 30 cents.

ARNOLD ARBORETUM

HARVARD UNIVERSITY



BULLETIN

OF

POPULAR INFORMATION

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The Red or Scarlet Maple (*Acer rubrum*). The flowers of the Red Maple are red on some individuals and on others pale yellow, trees with flowers of these two colors growing together over a large part of the region inhabited by this tree. On some trees the autumn leaves are of different shades of red or scarlet and on others clear yellow. If any reader of these Bulletins has noticed if the autumn color of the leaves of trees with red flowers is red and that of trees with yellow flowers is yellow the Arboretum will be glad to hear from him on the subject. On the left-hand side of the Meadow Road not far from the Jamaica Plain entrance and opposite the Administration Building there is a Red Maple with unusually dark crimson autumn leaves. This tree is interesting from the exceptionally beautiful color of the leaves at this season and from the fact that it is a grafted tree raised to show the possibility of propagating trees exceptional in the color of their autumn foliage. This branch of arboriculture has not been much practised, but when it is realized that the leaves on some individual trees or shrubs of a species assume more brilliant colors than those of other individuals of the same species, that this peculiarity is constant from year to year and that it can be preserved and multiplied by grafting, there is no reason why a demand for trees with exceptionally beautiful autumn leaves should not make possible the supply, just as the demand for trees of abnormal habit or with abnormal foliage, like a Mulberry with pendulous branches or a Beech with purple leaves, has created the supply.

Mountain Ashes. Many of these trees are now growing well in the Arboretum, and some of them are unusually full of fruit this year and handsome and interesting objects. Mountain Ashes have leaves divided into numerous narrow leaflets, compact clusters of white flowers which are followed by scarlet, yellow, orange-colored, pink or white, usually globose fruit which varies from a quarter to three-quarters of an inch in diameter. The best known and most commonly planted of these trees in the United States is the European *Sorbus Aucuparia*, the Rowan tree of Scotland. It is a tree from forty to sixty feet tall, of pyramidal habit while young, with erect branches which as the tree grows older spread out into a broad and graceful head. Here the leaves retain their color until the autumn is far advanced, and during September and October the contrast between the bright green leaves and the drooping clusters of brilliant red fruit makes this tree an attractive object until the birds strip it of its fruit. This Mountain Ash is common and widely distributed over the cooler parts of Europe and was probably early introduced into North America where it has been much planted in the extreme northern states and in Canada. Several varieties are recognized. The handsomest of these is the Moravian Mountain Ash (var. *moravica* or *dulcis*) of northern Austria. This is a tall tree with a smooth stem, leaves with narrower leaflets than those of the type and larger and sweeter fruit. It is used as food in central Europe. This Mountain Ash has grown in the Arboretum very rapidly and promises to become a large tree. Two specimens in the plantation near the top of Peter's Hill are now covered with fruit and are among the handsomest of the small trees in the Arboretum. There are forms of the Rowan tree with pendulous branches (var. *pendula*) and with fastigate branches (var. *fastigiata*). There is a form with yellow fruit and a variety from eastern Europe (var. *lanuginosa*) the leaves of which are covered on the upper surface with stiff hairs and are downy on the lower surface.

Asiatic Mountain Ashes. In recent years a number of these trees have been brought from eastern Asia to the Arboretum and some of them promise to be valuable trees here. The Japanese *Sorbus commixta* was the first of them which was planted here and it has now been growing in the Arboretum since 1888. There is a tall specimen of this species on the right-hand side of the path leading to the Shrub Collection from the Forest Hills Gate. It has smaller flower-clusters than the European species, the bright red fruit is smaller and its chief value is in the bright orange and red color of the leaves in autumn. A much handsomer plant is *Sorbus pekinensis*, a native of northern China, which is now well established in the Arboretum. It is a slender tree with narrow leaflets, compact clusters of flowers and lustrous pink or yellowish fruit in drooping clusters. The color of the fruit is unusual among Mountain Ashes. The narrow leaflets give this tree a particularly open and attractive appearance. There are a number of specimens in the Sorbus Collection in the low ground near the group of Swamp White Oaks on the Valley Road, but the largest and handsomest spec-

imen in the Arboretum is in the nursery plantation near the top of Peter's Hill. *Sorbus Koehneana* has flowered and fruited in the Arboretum this year for the first time. It is a shrub now about three feet high with slender erect stems, small leaves with numerous narrow leaflets, small compact clusters of flowers, and snow-white fruit. It is a beautiful shrub which when better known will become common in gardens. The plants in the Arboretum were raised from seeds collected by William Purdom in northern Shensi. *Sorbus pohuashanensis*, so named because it was discovered on the Pohua Mountains in northern China, is also well established in the Arboretum. The leaflets are rather broader than those of the Rowan tree, but it has the red fruit and woolly buds of that species and is not superior to it for general cultivation. Although they are not as large and shapely trees as some of the Old World species, the two Mountain Ashes of eastern North America, *Sorbus americana* and its variety *decora*, have no rivals in this group in the beauty of the great drooping clusters of orange fruit and in the orange and red tints of their autumn foliage. They are small trees or large shrubs and are often planted in gardens in Canada, northern Michigan and Minnesota, but unfortunately are still little known in those of eastern Massachusetts.

Sorbus alnifolia of the section *Micromeles* of the genus is perhaps the most satisfactory of the Mountain Ashes with entire leaves which can be grown here. It is a common Japanese tree and occurs also in Korea and northern and central China, and sometimes in its native countries grows to the height of sixty feet. Several specimens have been growing in the Arboretum since 1893 and are now from twenty to thirty feet tall. These trees are pyramidal in habit with pale smooth stems, upright branches which form a broad compact symmetrical pyramidal head, and dark green leaves three or four inches long, small white flowers in six- to twelve-flowered clusters, and abundant lustrous scarlet or scarlet and orange fruit which remains on the branches after the leaves and until eaten by birds which are fond of the fruit of all the species of *Sorbus*. The leaves turn bright clear yellow about the middle of October and soon fall.

Mountain Ashes thrive only in well-drained rich soil and suffer from drought and insufficient nourishment. They are particularly liable to the attacks of the San José scale, and in order to secure healthy plants it is important to spray them late in March or early in April with lime-sulphur.

The Spindle-tree or Burning Bush. By these names some of the species of *Evonymus* are popularly known. *Evonymus* is a genus of shrubs or small trees widely distributed over the temperate regions of the northern hemisphere and more abundant in species in eastern Asia than in North America or Europe. As a garden plant the species with deciduous leaves are chiefly valuable for their showy fruits, although the leaves of some of the Asiatic species become bright colored in the autumn. The flowers of all the species are inconspicuous. The fruit is a scarlet, red or whitish capsule, which when it opens displays

the seeds enclosed in a bright orange, scarlet or pink fleshy covering or aril. In the last issue of these Bulletins the autumn beauty of the Japanese *E. alatus* was referred to. Another species with leaves conspicuous at this season is *E. Maackii* from the Amoor region of eastern Siberia. This is a large, round-topped shrub, the oldest specimen in the collection being now eight or ten feet tall and twelve or fifteen feet across the head. The leaves are narrow, pointed at the ends, drooping, and early in October are dull red on the upper surface and pale green on the lower surface. The fruit is produced in great quantities and is rose color and half an inch in diameter, and the seeds are bright orange-scarlet and very lustrous. Although the leaves of the Japanese *E. yeddoensis* do not turn as brilliantly as those of some of the other Asiatic species and fall early, this round-topped shrub is one of the handsomest of the group when it is covered with its large, rose-colored capsules which remain on the branches long after the leaves fall. *E. Bungeanus*, a small tree from northern China, is an old inhabitant of the Arboretum, and every year it is conspicuous when its pale yellow fruit opens and the rose-colored seeds appear and the narrow drooping leaves turn pale yellow.

The European species, although they retain their green leaves until after the scarlet capsules open, are less ornamental plants here than some of the Asiatic species. The best known of the European species, *E. europaeus*, the English Spindle-tree, is a narrow tree which sometimes grows in this country to the height of twenty feet and is handsome in the autumn when the dark green leaves make a good background for the scarlet fruit. There is a variety with white capsules of no great ornamental value. On a form of this tree raised here from seeds sent from Hungary the leaves at this season become dark purple on the upper surface but remain green on the lower surface. The variety *ovata* which came to the Arboretum from a German nursery has broader leaves and larger fruit than the common form and promises to be a good ornamental plant here. *Evonymus latifolius* is another European species rather than a tree. The leaves are broader and the fruit is larger than that of the Spindle-tree. The fruit, unfortunately, is not produced as abundantly as that of most of the other species. *E. atropurpureus*, the Burning Bush of the United States, is a small tree which grows naturally from western New York to Montana and to Florida and Texas. The leaves turn yellow in the autumn some time before the crimson fruit falls. This tree is hardy in Massachusetts but has never taken very kindly to cultivation in the Arboretum. The Strawberry Bush, *E. americanus*, is a straggling shrub with slender semiprostrate stems and fruit covered with prickles. It is a common plant in the United States from New York southward, but has never found itself really at home in the Arboretum. *E. ovatus* is another American species with prickly and tuberculate fruit, and is a low shrub with prostrate stems. This species is valuable for covering the ground in the shade of larger plants where it grows vigorously; when exposed to the full sun it suffers here from the exposure.

ARNOLD ARBORETUM

HARVARD UNIVERSITY



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Hawthorns handsome in the autumn. Some of the American Hawthorns are more beautiful when their fruits ripen in the autumn than they are when the white flowers cover the branches in the spring and early summer, and there are great horticultural possibilities in these plants which are particularly valuable in those parts of the country where the soil is impregnated with lime. Indeed American Hawthorns, although they do not require lime, are lime-loving plants, and the largest number of species and the handsomest plants are found where lime abounds. In the parks of cities like Chicago, St. Louis and Pittsburg, where the smoke of bituminous coal is fatal to many plants, it has been found that American Hawthorns grow better than most trees and shrubs. It is impossible in one of these Bulletins to do more than mention briefly a few species which are exceptionally beautiful at this season and have shown themselves well suited for general cultivation.

Crataegus arkansana. This tree is a native of the valley of the White River in central Arkansas and was first raised in the Arboretum in 1880. It belongs to the Molles Group of the genus which is distinguished by its large usually tomentose leaves, large flowers and large scarlet, or rarely yellow, edible fruit. Like the other species of the group, *C. arkansana* is a tree which in the deep rich soil of Arkansas bottom-lands sometimes grows to the height of forty feet. The fruit of many of the species of this group, like *C. Arnoldiana* and *C. mollis*, ripens in August and September and soon falls; that of *C. arkansana* does not ripen until the middle of October when the leaves are still green

and remains on the branches until the end of November. This late ripening of the fruit after that of the other large-fruited species has disappeared makes *C. arkansana* one of the interesting and valuable species. The largest plant in the Arboretum is on the left-hand side of the South Street entrance just outside the gate where it is growing with a plant of *C. submollis*, a species of the same group, which loses its fruit early in September.

Nearly all the species of the Tomentosae Group, named for one of the species, *C. tomentosa*, and distinguished by the longitudinal cavities on the inner faces of the nutlets, have lustrous and showy fruits with the exception of *C. tomentosa* itself and some of the species closely related to it. *Crataegus prunifolia* is one of the handsome plants of this group. It is a large, compact, round-topped shrub or small tree with brilliant scarlet fruit and lustrous leaves which turn bright orange and scarlet in the middle of October. Although this plant was cultivated in England more than a hundred years ago and is certainly a native of North America, it is still unknown in this country as a wild plant. For at least a century botanists have considered *C. prunifolia* a variety of the Cockspur Thorn (*C. Crus-galli*) because the leaves somewhat resemble in shape the leaves of that tree, no one apparently having taken the trouble to examine the nutlets. *Crataegus succulenta* is another beautiful member of the Tomentosae Group with drooping clusters of scarlet fruits which remain hard until late in the autumn and then suddenly increase in size and become soft, succulent and translucent. It is a small tree not rare in the region from Massachusetts to Illinois and one of the handsomest species of the group. *Crataegus macracantha*, another species of this group, is remarkable for the long stout spines which thickly cover the branches and which would make it a good hedge plant. This species is particularly showy when the flowers in large, round-topped compact clusters open in June, but the fruit is less beautiful than that of *C. succulenta*. Species of this group are abundant in the neighborhood of Toronto and other parts of southern Ontario, and some of these Canadian plants, although they are not old enough yet to produce fruit here, promise to become important additions to the collection.

Crataegus nitida from the bottom-lands of the Mississippi River in Illinois near St. Louis, a member of a southern group (Virides), is, as has often been said in these Bulletins, one of the handsomest of the American species cultivated in the Arboretum. It is a wide-branched, flat-topped tree sometimes thirty feet high with narrow, dark green shining leaves which late in October assume the most brilliant shades of orange and scarlet, rather small flowers in numerous crowded clusters, and drooping, oblong, brick-red fruits marked by small white dots. Very different in appearance is another tree from the neighborhood of St. Louis, *C. coccinioides*. This has broad, deeply-lobed leaves which also become orange and scarlet late in October, but the flowers are an inch in diameter with twenty stamens and deep rose-colored anthers. The flowers are arranged in compact from five- to seven-flowered clusters, and are followed by subglobose, dark crimson, lustrous fruits

marked by large pale dots and nearly an inch long, and rather longer than broad. The fruit ripens about the middle of October as the leaves turn color and does not entirely fall before December. Another member of the same group as the last *C. durobrivensis* (Dilatatae), the Rochester Thorn, is valuable for the winter garden because the dark crimson fruit, which is nearly three-quarters of an inch in diameter, remains on the branches uninjured by frost until midwinter. It is a large shrub with flowers an inch in diameter in many-flowered clusters.

Crataegus pruinosa. This is the type of another northern group distinguished by its thick leaves usually broad at the base with long slender stems, large flowers and large fruit often broader than high, frequently angled, green or red covered with a pale bloom, surmounted by a prominent calyx raised on a tube, and hard dry flesh. Many of the species are handsome in spring and autumn and the type of the group, *C. pruinosa*, especially deserves the attention of planters. It is a small tree which grows naturally from southern Vermont to Missouri and along the foothills of the Appalachian Mountains. It has thick, blue-green leaves; the flowers are sometimes an inch in diameter and conspicuous from the twenty large, deep, rose-colored anthers, and the fruit, which is arranged in broad drooping clusters, is subglobose, rather more than half an inch in diameter, apple green until late in autumn, when it becomes dark purple red and very lustrous.

Dwarf Hawthorns. From the middle to the end of October there is not a more interesting group of small shrubs in the Arboretum than that of the species of *Crataegus* in the Intricatae Group which is arranged on the lower side of the road at the eastern base of Peter's Hill next to the Crabapple Collection. These shrubs are confined to the northern United States and Canada, and are perhaps more numerous in Pennsylvania and Michigan than in other parts of the country. They bloom later than most of the American Hawthorns, the flowers of all of them are large and conspicuous with yellow, rose-colored or pink anthers. The fruit ripens late and is scarlet, red, orange, yellow or russet, and its beauty is increased by the brilliant colors of the leaves at the time it ripens. A large number of these plants are now in the collection. One of the handsomest this year is *C. cuprea* with scarlet foliage and russet or copper-colored fruit. This little shrub was first detected in a vacant lot in the city of Wilmington, Delaware, and is not known to grow naturally beyond the limits of that city. *C. Delossii*, found growing several years ago by the side of a road near Toronto, is unusually full of its orange and red fruit this autumn. This species differs from the others of the group in the large number of fruits (ten to fifteen) compactly arranged in dense clusters. The autumn leaves are green and yellow. Other species of this group deserving attention are *C. infera* from the neighborhood of Sellersville, Bucks County, Pennsylvania, with orange-red fruit and brilliant orange and red autumn leaves; *C. frutuosa*, a shrub five or six feet tall which has only been found on the Serpentine Ridge near West Chester, Pennsylvania, with deep orange-red fruit in small erect clusters, and dark red-purple autumn leaves; and *C. modesta*, a little shrub often not more than

twelve or eighteen inches high, first noticed on a hill near Rutland, Vermont, but now known to grow in many places in southern New England and to range into eastern Pennsylvania, and conspicuous in the autumn with its bright scarlet leaves and green, yellow or orange and red fruits. Two species of the group in the southern Appalachian Mountain region, *C. Buckleyi* and *C. Boyntonii*, are small trees and have grown in the Arboretum into dense pyramids now eight or ten feet tall, and still covered with dark green leaves which later turn to shades of orange and scarlet.

The Tulip-tree (*Liriodendron*) is unfortunately not a native of eastern Massachusetts, although it occurs in the western part of the state and in Rhode Island. It is perfectly hardy here, and has grown to a large size in the neighborhood of Boston. It is therefore surprising that this tree is not more generally planted here for the American *Liriodendron* is one of the most magnificent trees of the northern hemisphere, growing as it does when all the conditions of soil and climate favor it, as in the rich "coves" of the southern Appalachian Mountains, to the height of two hundred feet and forming a trunk eight or ten feet in diameter and free of branches for half its height. The tulip-shaped flowers and the leaves, which are of unusual shape, are beautiful and interesting, but attention is now called to this tree on account of the beautiful color of the autumn foliage. This when the leaves first lose their green color is bright clear yellow but later as they begin to fall becomes darker and the color of old gold. In October in those parts of the country like Delaware County in eastern Pennsylvania, and on the slopes of the southern mountains where the Tulip-tree forms a considerable part of the forest and often raises its head high above its humbler companions, its spire-like bright golden crowns produce a beauty which can be found in no other part of the world. The Chinese Tulip-tree of recent discovery has not proved hardy in the Arboretum. It is a much smaller tree than the American species with smaller flowers but larger and handsomer leaves.

Pyrus Calleryana. This Pear-tree, which was raised here from seeds collected by Wilson in western China, has less beautiful flowers than many other Pear-trees, and the russet-colored fruit is not more than half an inch long. It may, however, prove to be one of the most valuable plants introduced into the United States by the Arboretum, for it is now believed by American pomologists that it will prove to be a blight-resisting stock on which to graft the varieties of garden pears. The Arboretum trees appear to be the only ones in the United States large enough to flower and this year they have produced a good crop of fruit which will be sent to the Department of Agriculture for distribution.

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OCTOBER 30, 1918

Some late October colors in the Arboretum. Now that the leaves of the Sweet Gum (*Nyssa*) and the Liquidambar have fallen the most brilliantly colored tree here is the Scarlet Oak (*Quercus coccinea*) which has no rival among the northern Oaks in the bright scarlet of its shining deeply divided leaves. We are here near the northern limits of the range of this tree and it is not very common in the neighborhood of Boston. In Plymouth County and in some parts of Cape Cod it is a prevailing tree, and to those who love the woods in autumn that part of the state is well worth a visit this week or next. The leaves of only one other Oak turn in the autumn to more brilliant shades of scarlet and that is the Turkey Oak (*Q. Catesbaei*) of the southern states, a smaller tree than the Scarlet Oak but with larger and often more lustrous leaves. Persons who like most northerners know the coast region of South Carolina and Georgia and the Florida peninsula only in late winter or in spring have little idea of the splendor of the color which the Turkey Oak gives that part of the country at the end of November. The leaves of some trees of the Pin Oak (*Q. palustris*) are turning scarlet or scarlet and yellow, and those of other trees are still nearly green, scarlet or nearly green leaves often occurring on the same branch. The Pin Oak is a handsome tree at this time of the year although it is less brilliant and conspicuous than the Scarlet Oak. This is true, too, of the Red Oak, the autumn leaves of which vary on different individuals from yellow to dark red, bright red, red and yellow, and brown. On the trees of the White Oak Group the handsomest autumn foliage is found on the White Oak itself (*Q. alba*). The leaves of this tree turn later than those of most Oaks and when in

perfection are often of a deep rich vinous red color. The other American White Oaks which are hardy here, the Bur Oak (*Q. macrocarpa*), the Swamp White Oak (*Q. bicolor*), the southern Overcup Oak (*Q. lyrata*), the Post Oak (*Q. minor*) and the three Chestnut Oaks (*Q. montana*, *Q. Muehlenbergii* and *Q. prinoides*) turn yellow in part or entirely in the autumn, and from most of these the leaves fall earlier than those of *Q. alba*. Among the White Oaks the leaves of which turn yellow in the autumn a single individual of the Swamp White Oak with large, bright scarlet autumn leaves is a remarkable exception to the general autumn color scheme of these trees. This is one of the most remarkable and interesting trees in the Arboretum collection of Oaks. It is growing in the mixed plantation by the road at the summit of Peter's Hill and was probably raised in the Arboretum, although unfortunately no record of its origin has been kept.

Among the smaller trees with scarlet or crimson autumn foliage none is more beautiful now than the so-called Flowering Dogwood (*Cornus florida*) which is unusually brilliant this year in its shades of crimson, scarlet and green. Its autumn beauty is increased by the contrast of of the color on the upper and lower surface of the leaves for only the upper surface changes color, the lower surface retaining the pale some times nearly white color of the summer. Another tree with leaves red or scarlet on the upper surface and pale on the lower surface, *Acer nikkoense*, is well worth the attention of persons interested in the autumn color of tree leaves. *Acer nikkoense* is a native of the mountain forests of central Japan and is one of the species with compound leaves related to the Ash-leaved Maple or Box Elder (*Acer Negundo*) of the United States. There are several good specimens of this handsome tree in the mixed plantation on the road near the top of Peter's Hill where the leaves of these trees are now beginning to change color. Another small Maple from northern Japan, *A. Sieboldianum*, has been conspicuous this year in the intense scarlet of its leaves which are now beginning to fall. The best plants in the Arboretum of this tree are also in the mixed plantation on Peter's Hill.

Several plants are interesting now from the dark purple color of their autumn leaves. Among these is a variety of *Prunus serrulata* (var. *pubescens*), a large pink-flowered Cherry raised from seeds collected by Wilson in western China. One of the Japanese species of *Stuartia* (*S. pseudocamellia*) has autumn leaves even darker than those of this Cherry. This *Stuartia* is a hardy little tree with pale smooth bark exfoliating in large thin scales and white flowers which look like those of a single-flowered *Camellia*, and open in summer. There are good specimens of this tree on the left-hand side of Azalea Path. *Akebia quinata*, the Japanese species with leaves composed of five leaflets and small dark purple flowers, is well known in American gardens. The leaves fall late in the autumn without having changed color. The other Japanese species, *A. lobata*, is less well known in this country. From the other species it differs chiefly in the three, not five, rather larger leaflets which turn late in the autumn to a handsome dark bronze color. In this country the *Akebias* rarely produce fruit, which resembles in shape a short thick banana and is pale violet in color. It

contains many small seeds imbedded in sweet juicy insipid pulp of which the Japanese appear fond, as the fruit of *A. lobata* is found in September in great quantities in the markets of the towns of northern Japan.

Vaccinium Carlesii, although discovered in Korea only a few years ago, is fast becoming a popular garden plant in the United States where it is admired for its compact clusters of fragrant white flowers which open from rose-colored buds, closed buds and open flowers occurring together in the same cluster. The value of this handsome little shrub is increased by the autumn color of the leaves which are now dark bronze purple. Little has been known of this plant in its native country but Mr. Wilson, who has passed the last two summers in Korea, writes of it, "This is a maritime species fond of cliffs and rocky soil; it grows in localities rather remote one from the other and is nowhere common."

Witch Hazels (*Hamamelis*). The different species of this genus add to the interest of the Arboretum in the autumn and winter by the colors of their leaves and the opening of their flowers. The first species to change its color is *Hamamelis japonica*, one of the winter-flowering species. The leaves of the other Witch Hazels turn bright clear yellow in the autumn, but the autumn color of the leaves of the Japanese species is scarlet and orange. During a week early in October the leaves were brilliant but they have now fallen. The pale clear yellow autumn leaves of the eastern American species (*H. virginiana*) have nearly all fallen from the branches which are now covered with pale yellow flowers. The leaves of the other American species (*H. vernalis*) are still green on some individuals and on others are beginning to turn yellow. Toward the end of December or early in January this shrub, which grows naturally along small streams in southern Missouri, will be covered with flowers. The dull blue-green leaves of the Chinese *Hamamelis mollis* are still as green as they were in mid-summer but later they will turn to a beautiful shade of pale yellow. The flowers of this remarkable plant open usually late in January or early in February and are larger and more conspicuous than those of the American or Japanese species. No winter garden can be complete without these winter-flowering shrubs.

Enkianthus. The autumn colors of the leaves of the four Japanese species of this genus of the Heath Family which are established in the Arboretum have been remarkably brilliant during October and it is unfortunate that these handsome plants are not more generally found in gardens in those parts of the United States where the presence of lime does not make the cultivation of plants of the Heath family impossible. All the species have bell-shaped flowers arranged in gracefully drooping clusters, but their greatest beauty is in the color of their autumn leaves. This is scarlet, crimson or deep wine color on the different species. The deep crimson or scarlet colors which the leaves of *E. perulatus* or *japonicus* assume make this the showiest of the species at this season and one of the most popular plants in Japan where it is usually cut into dense round balls. In the Arboretum this shrub has

not produced seeds and it has remained rarer in this country even than the other species. The large group of these plants on the right-hand side of Azalea Path shows the habit and autumn coloring of the leaves of the different species.

Blueberries in autumn. The leaves of all the deciduous-leaved Blueberries and Huckleberries turn bright scarlet late in the autumn, and as a ground cover in native woods there are no more beautiful plants than the three dwarf Blueberries of the eastern states, *Vaccinium pennsylvanicum*, *V. canadense*, *V. vacillans*. In the whole northern hemisphere there is hardly a shrub which equals the Highbush Blueberry, *V. corymbosum*, for the decoration of New England gardens. The white flowers in drooping clusters are beautiful, the blue-black fruits are even more beautiful than the flowers, but it is in the late autumn that this shrub is most valuable as a garden or woodside ornament for the crimson of its autumn leaves is not surpassed in intensity by that of any other shrub. There is considerable variety in the shades of color in the leaves of different individuals, and on some plants crimson and green leaves are found together. There are a number of plants of this Blueberry on the sides of Azalea Path near its entrance from Bussey Hill Road which show the variety of autumn leaf color of this Blueberry.

Forsythias. The leaves of all the Forsythias usually fall, like those of the garden Lilacs, without having greatly changed color, but occasional plants of *F. suspensa* var. *Fortunii* occur on which the upper surface of the leaves turn bronze purple while the lower surface retains its summer color. Such plants are more valuable than those with green autumn leaves and should be propagated.

Barberries in late October. The leaves of many of the Barberries in the Arboretum collection have now turned crimson, scarlet, or scarlet and orange, making these plants which are now covered with scarlet fruit conspicuous. Of the species closely related to the common Barberry (*Berberis vulgaris*) the handsomest perhaps is the Japanese *Berberis Regelii*, a large shrub with large pale flowers, large fruit and leaves which turn orange and scarlet. Although still rare here, this plant was brought to the United States more than fifty years ago and was long cultivated in the Parsons' Nursery on Long Island as *Berberis Hakkodate*. The Chinese *B. diaphana* is probably now the handsomest of the species with dark crimson autumn foliage. This is a low, round-topped shrub broader than high, with large solitary flowers which rarely produces fruit here. The only objection to it is that the leaves unfold so late that the plants appear dead when other Barberries are covered with nearly fully grown leaves. Among the new Chinese species the most beautiful Barberry in the autumn is *B. circumserrata*, a small round-topped shrub with large solitary flowers and leaves which in another week will be of as brilliant shades of scarlet as those of any plant in the Arboretum. Other species which are particularly attractive this week are *B. koreana*, *B. lucida*, *B. amurensis*, and *B. dictyophylla*.

ARNOLD ARBORETUM
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In the early numbers of the present volume of the Bulletin the effects of the severe winter on many plants in the Arboretum was discussed. Several plants which were then believed to be dead produced leaves in June and some are now apparently in good health; others which were only killed to the ground have grown again from the stumps and the damage by the winter has been less severe than it was believed to be in May.

Oaks. In the third week of May the Willow Oak (*Quercus Phellos*), the southern Overcup Oak (*Q. lyrata*), the Spanish or Red Oak of the south (*Q. rubra* or *falcata*), the so-called Turkey Oak of eastern Europe (*Q. Cerris*), the hybrid *Q. heterophylla* from the middle states, and a little Oak from Stone Mountain, Georgia (*Q. georgiana*), appeared to be dead. Six weeks later they were covered with healthy leaves, with the exception of the last which after a hard struggle for life finally died. Fortunately this species is represented in the Arboretum by a healthy young specimen which was not injured by the winter. A fine specimen of the weeping form of one of the European Oaks (*Q. Robur* var. *pendula*), which appeared in the spring to have been ruined, escaped with the loss of a single branch. A vigorous species of the native Black Oak (*Q. velutina*), one of the common trees in Massachusetts, growing with others in the Oak collection, was killed, showing that exceptional cold like that of the past winter may kill even the hardiest native trees. This is shown, too, in the fact that two trees of the Sour Gum (*Nyssa sylvatica*) were killed in the group by the little pond near the junction of the Meadow and the Bussey Hill Roads.

Ashes. The three trees of *Fraxinus syriaca*, often cultivated as *F. sogdiana*, which have been uninjured in the Arboretum for thirty-eight years and have frequently flowered and ripened their fruit here, were killed to the ground but have now sent up a few feeble shoots from the roots. The flowering Ash so called, (*Fraxinus Ornus*) of southeastern Europe, which has suffered before in the Arboretum but flowered here in the spring of 1917, is now represented by a few weak stump shoots which did not appear until September. *Fraxinus Paxiana*, one of the new introductions from western China, was killed in the Ash collection, but was not injured in the Peter's Hill Nursery.

The Liquidambar and other trees. The North American Liquidambar opened its leaf-buds so late that by the middle of May the trees looked as if they were hopelessly injured. Later they entirely recovered, and in October the leaves of this beautiful tree have not before been more brilliantly colored here. A single plant of the Chinese *Liquidambar formosana* is still living in the Peter's Hill Nursery; it is, however, only a bush for it is more or less injured every winter, and it is probable that this tree will never flourish in the United States except in some of the Gulf and Pacific coast states. *Catalpa Bungei* has not suffered before in the Arboretum but many branches on all the trees were killed by the winter, and one of the two specimens in the Catalpa collection on the hill above the Lilacs was killed to the ground but has now sent up a number of shoots from the roots. The condition of the three Persimmon trees (*Diospyros virginiana*) in the group on the right-hand side near the lower end of the Bussey Hill Road illustrates the fact that some individuals of a species can resist cold better than other individuals of the same species. These three trees were of the same origin and the same age; two are uninjured and the third is now represented by a few weak suckers from the roots.

Various shrubs injured by the winter. Although it was believed in May that the Arboretum had lost a number of species by the excessive cold of the winter, the actual loss has not been as serious as it then appeared. All the plants, however, of the Japanese *Ilex crenata* were killed. These plants have been growing in the Arboretum for twenty-five years and had never suffered in earlier winters more than the loss of a few leaves. This Holly was believed therefore to be one of the few broad-leaved evergreens which could be safely used in northern gardens. Plants of the Inkberry (*Ilex glabra*), a common Atlantic and Gulf coast shrub from New Hampshire to Texas and one of the handsomest and hardiest of the broad-leaved evergreen shrubs which can be grown here, lost for the first time in the Arboretum a large part of their leaves and a few branches during the winter. The plants soon recovered, however, and are now as thickly clothed with leaves as they were a year ago. The largest plants of *Ilex opaca*, another native of the Massachusetts coast region, were killed outright, but smaller plants, although they lost most of their leaves, are still alive. One of the new Chinese species of Magnolia (*M. Wilsonii*), *Daphne genkwa* and *Lonicera Delavayi* appear to be the only species of recent introduction which have been actually killed. All the plants of *Sophora viciifolia* appeared to be dead until June when the leaves began to unfold. None

of the plants flowered but they are all in good condition. All the plants of the new Chinese genus of the Witch Hazel Family (*Sinowilsonii*) appeared to be uninjured in May but many of the branches died after the leaves were fully grown, and although these plants may recover their present condition is not satisfactory.

Evergreen Barberries. It is a satisfaction to be able to report that the four species of evergreen Barberries from western China in the collection, *Berberis Julianae*, *B. Sargentiana*, *B. Gagnepainii* and *B. verruculosa*, are now in good condition, although the leaves of all but the last species were killed and many of those of *B. verruculosa* were injured. It may be expected therefore that these beautiful plants may continue to live in eastern Massachusetts if suitable positions can be found for them.

Corylopsis. The two species of western China which were covered with flowers in the spring of 1917, *C. Willmottiae* and *C. Veitchiana*, were killed to the ground by the cold of the winter and are now represented by feeble stump-shoots, and it is doubtful if these plants can be successfully and permanently grown in this climate. The Japanese *C. pauciflora* and *C. spicata*, which lost their flower-buds and some branches have not looked well through the summer but are recovering. Another Japanese species, *C. Gotoana*, which was uninjured in bud and leaf, seems destined to become a popular garden plant in the northern states.

Several other shrubs which were injured by the winter and in May and June gave little promise of recovery, are now alive and will probably entirely recover. Among them is a plant of the Japanese *Lindera obtusiloba* which, although it has been growing in the Arboretum for twenty-five years, is still one of the rarest plants in the collection as it has not borne seeds and has proved difficult to propagate. This plant is most beautiful in the autumn when the leaves during the first week in November are the color of gold. Another Japanese Benzoin, *B. sericea*, which was injured by the winter will probably recover, although this plant has suffered in less severe winters and will probably never be valuable in this climate. The two *Dipeltas*, a Chinese genus related to *Weigela*, which were killed to the ground have produced shoots from the roots. These plants, although they have flowered sparingly in the Arboretum, have suffered from cold before and it is doubtful if they can be successfully grown in Massachusetts. *Rhus Potaninii*, *Cornus paucinervis*, *Salix Bockii*, *Osmaronia cerasiformis* and *Ceanothus Wrightii* have recovered, as was predicted in the Bulletin issued on the 16th of May. The most important of these for the garden is *Cornus paucinervis* for it flowers here late in July when comparatively few shrubs are in bloom. It is a narrow shrub with numerous upright stems five or six feet high, small narrow pointed leaves with only two or three pairs of veins, small flat clusters of white flowers and small black shining fruits. If this plant proves as hardy in eastern Massachusetts as it has at Rochester, New York, it will be one of the most valuable of Wilson's introductions from western China. *Coluteas* bloom on the branches of the year and all the species, although they had been killed

to the ground were later as full of flowers and fruits as they were in ordinary seasons.

The following plants believed to be dead in the spring are still alive, although it is doubtful if they can be permanently successful in this climate: *Stachyurus chinensis*, *Staphylea holocarpa*, *Poliothyrsis sinensis*, and *Fortunearia sinensis*. The *Staphylea*, which Wilson believed to be one of the handsomest of the small trees which he saw in China, has never done well in the Arboretum, and although there is still life in some of the small plants it is doubtful if it ever flowers here. *Viburnum ovatifolium*, which was reported in May to have been killed, has grown again from the roots, and all the Chinese *Viburnums* with deciduous leaves are now in good condition. The two evergreen species which live here, *V. rhytidophyllum* and *V. buddleifolium*, lost their leaves from the cold but are now covered with a new growth and look as well as they usually look here at this season of the year. They are better suited, however, for a milder climate than that of New England. *Lonicera Henryi*, a Chinese species with twining stems and evergreen foliage, was killed to the ground but is growing again. This beautiful plant flowered for several years in the Arboretum and was believed to be perfectly hardy and an important addition to the small number of broad-leaved evergreens which can be successfully grown in the northern states.

Broad-leaved Evergreens. The colors which the leaves of a few of these assume in the autumn add greatly to the beauty of these plants in November. The most conspicuous change of leaf color on any of these plants is on the Rocky Mountain *Mahonia* (or *Berberis*) *repens*. From light bluish green the leaves turn to pale violet color in the autumn. This is one of the handsomest and hardiest evergreen plants which can be used here to cover the ground under larger plants; it grows only a few inches high, spreads rapidly by underground stems, and the bright yellow flowers are large and conspicuous. It is unfortunate that eastern nurserymen have not yet learned the value of this plant. The small dark green leaves of the Box Huckleberry (*Gaylussacia brachycera*) become in the autumn deeply tinged with red when the plant is fully exposed to the sun, and the leaves of *Pachystima Canbyi* are more or less tinged with violet. These are two of the rarest plants in the United States, being known now only in two localities, the first in Pennsylvania and the other in West Virginia where the *Pachystima* has not been seen, however, for nearly fifty years. The leaves of *Leucothoe Catesbaei* often turn deep bronze color in the autumn. This plant which has always been considered hardy in eastern Massachusetts, suffered seriously during the winter. Most of the plants lost the ends of their branches and their leaves, and many were killed outright in a particularly favorable position for this shrub where it had been established for nearly twenty years. The *Rhododendrons* are in good condition and generally well furnished with flower-buds, and the Laurels (*Kalmia latifolia*) have not before in the Arboretum given such promise of abundant bloom.

ARNOLD ARBORETUM

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In the Pinetum. The collection of cone-bearing trees and shrubs is of special interest this autumn as during the past twelve months it has had to endure such severe weather conditions that plants which are now in good condition should be able to successfully support any extremes of heat, cold and dryness which they are likely to meet with in Massachusetts. In discussing the possibility of cultivating conifers in the northeastern United States it must be remembered that at its best this is not a favorable climate for these trees. There are only a few indigenous species here in New England, and all the exotic species which can be grown here grow better in other parts of the world. This is the region for trees and shrubs which lose their leaves in autumn and the man who wants to plant successfully and permanently here must use these plants, and not conifers or broad-leaved evergreens, unless he is prepared to suffer many disappointments. It is the business of a scientific establishment like the Arboretum to experiment with all plants which, judged by the region where they grow naturally, have any chance of success and to report failures as well as successes. Enough is now known of the habitat and climatic conditions necessary for the conifers of the world to make it possible to say that none of these trees which grow in any part of the world south of the equator can grow here. It is now known that none of the conifers of the southern United States, Mexico, Central America and the West Indies can be grown in the north. This is true, too, of the species of southern Europe, northern Africa, southern India, southwestern China, Formosa and the southern islands of the Japanese empire. Of the conifers of the Pacific coast of North America only a few can grow at all in the east. The planter of conifers therefore in the

New England, middle and middle western states must make his selection from native species, and from the species of northern Japan, Korea, northern China, Siberia, the Caucasus and eastern and northern Europe. That is, the largest and some of the handsomest and most interesting trees in the world cannot be successfully grown in the United States except in the south, and in western Washington, Oregon and California where the climate is better suited to the successful cultivation of conifers perhaps than that of any other part of the world, with the exception possibly of New Zealand where conifers from all parts of the world have grown with astonishing rapidity and vigor, and in the case of some species to a larger size than individuals of the species attain in their native lands.

In spite of the unusual and prolonged cold of the winter which followed a dry summer, the cold spring and the drought which lasted from April to September the Arboretum conifers are not in bad condition, and it is now possible to discuss with more confidence the value of many exotic species than it has been before. Only one species has been entirely lost from the effects of the severe winter. This is the blue-leaved form of *Cedrus atlantica*, a native of the mountains of Algeria. There was only one specimen in the Arboretum where it has been growing for many years in a sheltered position in the middle of a Pine grove. This beautiful tree sometimes grows fairly well south of Cape Cod, but there is little hope that it will live for more than a few years at a time in Massachusetts.

Some of the species of the northeastern states have suffered more than any of the exotic species, and several plants of the Red Spruce (*Picea rubra*) were killed or so badly injured that it was necessary to destroy them. If any coniferous tree should be hardy here it is the Red Spruce which grows on some of the high mountains of New England and close to the seashore of Maine and New Hampshire where it is fully exposed to the gales from the Atlantic. The Red Spruce, although there are now a number of healthy individuals in the Arboretum, does not take very kindly to cultivation and always grows slowly. Another eastern American tree, the short-leaved Pine (*Pinus echinata*) was injured by the winter. This tree finds its northern home on Staten Island, New York, and there have been a number of trees raised from seeds collected at this northern station growing in the Arboretum for twenty years. These all lost their leaves and several were killed; the others produced new leaves in June and now look nearly as well as ever. One specimen of this Pine raised here in 1879 from Missouri seeds also lost all its leaves but is now in comparatively as good health as it was a year ago. Several plants of the White Cedar of the eastern states (*Chamaecyparis thyoides*) lost their tops and were a good deal injured by the winter although none were killed. This plant has not taken kindly to the conditions the Arboretum affords it, but it is surprising that it is not more hardy here, as within twenty miles of Boston there are hundreds of acres of low ground covered with forests of this tree.

Cedar of Lebanon. The Cedars of Lebanon raised here from seeds gathered on the Anti-Taurus, which have been growing in the Arboretum for sixteen years and which have not before been injured by heat

or cold, in early spring lost all their leaves which had been killed by the excessive cold of the winter; they soon put out a new growth, however, and although the branches are now less densely covered with foliage than in other years the trees are in good health. Among the Spruces and Firs the Grecian and Roumanian form of *Abies cephalonica* (var. *Apollinis*) suffered the most, and although the plants are still alive they can never grow into good trees. Some small plants of *Abies cephalonica* were killed, but the large plants of this Fir in the collection are in good condition, although this tree was badly injured in other collections in Massachusetts and New York. *Abies cilicica*, which has been for many years considered one of the hardiest and handsomest of the Firs which can be grown in the northeastern states, has suffered seriously in other collections, but in the Arboretum it was little injured by the winter and is now in good condition. *Abies amabilis* from the Cascade mountains of Oregon, although always a slow-growing, shabby looking tree in cultivation, lost a good many leaves in the spring but is now in its usual health. *Abies grandis* from the northwest coast, planted in sheltered and exceptionally favorable positions, is uninjured, but for general use in New England this handsome tree should not be depended on. The Sugar Pine of the California Sierras (*Pinus Lambertiana*) and the Chinese White Pine (*P. Armandi*) lost a good many leaves but now look as well as usual. The Japanese Black Pine (*P. Thunbergii*) suffered more in the loss of its leaves, but the buds were uninjured and the trees, although somewhat disfigured, are recovering.

Among the long established trees here which are not native in New England and which show no evidence of having just passed through the most serious experience of their lives, and may therefore be considered suitable for cultivation in the northern states, are all the forms of the Norway Spruce (*Picea Abies*), the Balkan Spruce (*P. omorica*), the Caucasian Spruce (*P. orientalis*), the Siberian *Picea obovata*, *Picea Schrenkiana* from Chinese Turkestan, all the Japanese species, and the species of the Rocky Mountains *P. pungens*, *P. Engelmannii* and the western form of *P. canadensis*. The Firs not already mentioned which have not been injured are the Rocky Mountain form of *Abies concolor*, which is the most satisfactory of all Firs in the northeastern states, the Caucasian *Abies Nordmanniana*, the Japanese *A. homolepis*, (or *brachyphylla*) and *A. Veitchii*. Like the eastern American Balsam Fir (*A. balsamea*), the Rocky Mountain *A. lasiocarpa* and the Fir of central Siberia (*A. sibirica*) are perfectly hardy here, but are short-lived shabby trees in cultivation, and are not worth planting in eastern North America. The Korean *A. holophylla* was first raised at the Arboretum twelve years ago and it is still one of the rarest of all conifers in cultivation. Fortunately Wilson sent from Korea a year ago a supply of seeds of this tree; these germinated well and there are now many seedlings in this country and Europe. The twelve-year-old plant has grown well in the Arboretum; it has not suffered from cold or heat and promises to be a good tree here. The Douglas Spruce (*Pseudotsuga mucronata*) raised from seeds gathered in Colorado, has been growing in eastern Massachusetts for nearly fifty years and promises to live long here and grow to a large size. Numerous specimens of the Carolina Hemlock (*Tsuga caroliniana*) have been uninjured by the cold and drought of the year. This is one of the handsomest of

all cone-bearing trees which can be grown in this part of the country. One plant of the Japanese *Tsuga densiflora* was killed during the winter, but several others were uninjured. Small plants of the Japanese *T. Sieboldiana* have lived in an exceptionally sheltered position, but there is little hope that this beautiful tree, which is more southern in its range than the other Japanese Hemlock will ever live long in Massachusetts. A small plant of the Hemlock of the Northwest coast of North America (*T. heterophylla*), the largest and handsomest of all Hemlock trees, was uninjured in a sheltered position. There is not much probability, however, that this tree will live for more than a few years in this part of the country. The Chinese Hemlock (*T. chinensis*) was injured by the winter and probably will never be very successful here.

Pines. The European and Asiatic* *Pinus sylvestris*, the so-called Scotch Pine, the Austrian and other forms of the European Black Pine (*P. nigra*), the forms of the European *P. montana*, and the Swiss and Siberian forms of the Stone Pine (*P. Cembra*) have not been injured. The Japanese White Pine (*P. parviflora*), the Japanese Red Pine (*P. densiflora*) and the Korean form of this tree which the Japanese botanists call *Pinus gracilis*, seem able to support the New England climate without injury. The Korean Nut Pine (*P. koraiensis*) which has produced seeds in the Arboretum for several years, and the Lacebark Pine of northern China (*P. Bungeana*) are uninjured. Of the Pines of western North America only *Pinus monticola*, *P. ponderosa* var. *scopulorum*, and *P. Jeffreyi* grow successfully in the east, and these are uninjured, as are the eastern American *P. pungens* and *P. virginiana*. The northern *Pinus Banksiana*, which just reaches northern New England, with a doubtful station on Nantucket, grows well in the Arboretum but not as well as it grows much further north. Although killed last winter in some New England collections, the Japanese Umbrella Pine was little injured in the Arboretum.

None of the Arbor Vitae in the large collection of these trees here suffered with the exception of the Chinese *Thuja orientalis* which is never a very hardy or satisfactory tree in this part of the country. It is of particular interest that plants of the western Arbor Vitae, the so-called Red Cedar of the northwest (*T. plicata*), raised here from seeds gathered in Idaho, have been uninjured, for this is one of the great conifers of the world. In a sheltered position several plants of the California Incense Cedar were little injured by the winter. There has been little injury to the Junipers, and the Larches and the Chinese *Pseudolarix* have not suffered.

New Chinese Conifers. It is too soon to say much about the new conifers introduced by Wilson from northern China. All the forms of *Pinus sinensis* are growing well and appear to be hardy. All the Spruces have also done well with the exception of *Picea Sargentiana* which has suffered from cold and will probably not be hardy here. The Chinese Firs grow less well than the Spruces and only *Abies Delavayi* gives much promise of success.

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Dwarf Conifers. Of many of the cone-bearing trees there are abnormal dwarf forms, and a few conifers are naturally dwarf shrubs. The former are of different origin; most of them are seedlings, some have grown from buds on branches of large trees, and others have been produced by exposure to excessive cold and high winds, and these when transferred to more favorable surroundings often lose their dwarf habit. A good example of a dwarf of the last class is the depauperate Larch which grows at the timber line on Mt. Fugi in Japan. Seedlings of this little plant raised in the Arboretum twenty-five years ago are now nearly of the same size as the seedlings of the trees of the Japanese valleys raised at the same time. In the sandy swamps of Prince Edward Island Black Spruces not more than two feet high produce cones and fertile seeds, and near the timber line of the White Mountains it is possible to walk on dwarf mats of the Balsam Fir which lower down on these mountains is a tall tree. Transferred to better soil where the winter climate is less severe these alpine and boreal dwarfs would soon assume the tree habit of the species. Dwarfs of some species, however, which evidently owe their habit to environment, retain the dwarf habit when transferred to more favorable surroundings. Such dwarfs are some of the forms of the European *Pinus montana* from high altitudes and some dwarf forms of Junipers which reproduce the dwarf form in their seedlings. Seedling dwarfs have been produced by many different species, but they are naturally most numerous in species which have been largely raised in nurseries where seedlings are carefully watched and abnormal forms are preserved. It is not surprising therefore, that trees like the eastern Arbor Vitae and the Norway

Spruce have produced many such forms in nurseries as few other cone-bearing trees have been so largely raised from seed.

It is only in recent years that dwarf conifers have attracted much attention, for Loudon in his "Arboretum et Fruticetum Botanicum" published in 1838 enumerates only ten. These are two dwarf forms of *Pinus montana*, two forms of the Norway Spruce, a dwarf Cedar of Lebanon, a dwarf Red Cedar (*Juniperus virginiana*), a prostrate form of *Juniperus sabina*, and two dwarf forms of *Juniperus communis*. He knew no dwarf Arbor Vitae, Chamaecyparis, Hemlock, or dwarf form of Abies. Beissner in the second edition of his "Handbuch der Nadelholzkunde," published in 1899, enumerates one hundred and four dwarf conifers in thirty-one species; of these twenty-five are forms of the Norway Spruce, eight are forms of Lawson's Cypress (*Chamaecyparis Lawsoniana*), and eight are forms of the Arbor Vitae of the eastern United States. In addition to the plants enumerated by Beissner there are a few which originated in this country and which do not appear to have been known to him.

There is a good but by no means a complete collection of dwarf conifers in the Arboretum, for it is difficult to keep track of the new forms which appear in the nurseries where large numbers of conifers are raised from seed and are often given names without descriptions, and some dwarfs like those of Lawson's Cypress and the Chinese Arbor Vitae are not hardy here. The Arboretum collection is much visited, however, by nurserymen for there is now a demand for these plants, which have their uses in small gardens and are less happily planted in making low banks of foliage about the base of suburban cottages.

Perhaps the handsomest of the dwarf conifers in the Arboretum collection is a form of the Japanese *Pinus densiflora* (var. *umbraculifera*). This is a wide, vase-shaped plant which in Japanese gardens is often ten feet high and broader than high. The leaves are of a bright cheerful green and comparatively small plants flower and produce minute cones. Among the fourteen or fifteen dwarf forms of the Norway Spruce none is handsomer than one of the varieties described by Loudon in 1839 (var. *Clanbrasiliana*). This is a low, very compact, round-topped bush which rarely grows more than three feet high but spreads to a diameter much greater than its height. The plant is said to have originated on the Moira estate near Belfast, Ireland, toward the end of the eighteenth century and to have been carried to England by Lord Clanbrasil for whom it was named. Equally good is the variety *nana* which has a flatter top and does not grow as tall as the *Clanbrasiliana* but spreads into a broad bush. The subglobose var. *Gregoriana* and the variety *prostrata* are interesting plants. Some of the dwarf Norway Spruces, especially the variety *Ellwangeriana*, have a tendency at the end of a few years to form a vigorous leading shoot and eventually to become arborescent.

Two dwarfs originated in the Arboretum in 1874 among seedlings of *Picea pungens*, the Colorado Blue Spruce and *Abies lasiocarpa*. The original plant of the former is now seven feet high and ten or twelve

feet in diameter, and has so far escaped the loss of branches which disfigures this Spruce after it is thirty years old. Although well worth the attention of lovers of dwarf conifers, *Pinus pungens compacta* is little known beyond the limits of the Arboretum. The seedling of *Abies lasiocarpa* retained its dwarf habit for many years but has now begun to grow more vigorously and to assume the typical habit of the species. The dwarf of the European Silver Fir (*Abies Picea compacta*) behaves here in the same way and after a few years grows out of its dwarf habit. There is in the collection a small plant of a dwarf of *Abies concolor* which is very compact, but it is too soon to speak of its value. The well known dwarf of the Balsam Fir (*Abies balsamea* var. *hudsonica*) is a real dwarf only a few inches high. A number of seedling forms of the White Pine (*Pinus Strobus*) and of the Scotch Pine (*Pinus sylvestris*) are in the collection, but the best known and most generally planted dwarf Pines are the mountain forms of the European *Pinus montana* which appear in the catalogues of nurserymen as *Pinus pumilio* and *P. Mughus*. There are many forms of this hardy dwarf; they are broad shrubs with erect or semiprostrate stems and are rarely more than ten feet high, but often much broader than tall. Seedlings of these plants show great variation in size and habit, and new forms are constantly found in nursery seed-beds. The dwarf form of the Douglas Spruce (*Pseudotsuga Douglasii* var. *globosa*) has proved one of the slowest growing of these plants in the Arboretum collection.

In the common Hemlock of eastern North America the tendency to variation in seedling plants is unusually strong and dwarfs differing in size, shape and vigor are often found in the neighborhood of Hemlock groves. Some of these have been propagated and have received names but as different names have been used for the same or nearly the same forms it is not now possible, even if it were desirable, to distinguish all these dwarf Hemlocks by name.

Among the seedlings of the Arbor Vitae of eastern North America are found some of the handsomest of the dwarf conifers. There is a large collection of abnormal forms of this tree in the Arboretum collection and among them none are better than those called "Little Gem," *compacta* and *Hoveyi*. Seedlings of the Japanese Retinosporas (*Chamaecyparis obtusa* and *pisifera*) show, too, a great tendency to variation. One of the handsomest of these forms is *C. obtusa nana*, a compact, pyramidal, slow-growing plant. The largest specimen in the collection is now about eight feet tall. Other forms of *C. obtusa* are compact mats which show little indication of growing more than a few inches high. In the collection there are among others dwarf forms of *C. pisifera*, plants with yellow-tipped branches and others with yellow and with white leaves and plants of the variety *filifera* with green and with yellow leaves.

Among the Junipers are found some of the most useful dwarf conifers. Some of these are forms of arborescent species and others are natural dwarfs which reproduce themselves from seed. Among the former are three varieties of the so-called Red Cedar of the eastern

states (*Juniperus virginiana*). One of these (var. *globosa*) is a compact, round-topped bush taller than broad, and in the Arboretum collection where it has been growing for fifteen years it is about three feet high. The history of this plant is not known at the Arboretum. It came here from Holland and probably originated in a European nursery. The variety *Kosteriana* forms a wide open bush with erect and spreading, gracefully arching stems from two to three feet tall. This is an unusually handsome plant which will prove useful for the margins of beds of taller growing conifers. This variety probably also originated in a European nursery. More interesting even than these nursery forms of the Red Cedar is a plant which grows on a few wind-swept cliffs on the coast of Maine. Plants of this form are not more than eighteen inches high, with prostrate stems which spread into dense mats sometimes fifteen feet across. These plants bear fertile seeds, and there are seedlings, grafted plants and young collected plants growing in the Arboretum, but it is too soon to judge if they will retain the habit of the wild plants when planted in less exposed situations. If this form of the Red Cedar retains its dwarf habit in cultivation it will be one of the handsomest of the prostrate Junipers. Of *Juniperus chinensis* there are a number of interesting shrubs in the Arboretum collection. The handsomest of these, var. *Pfitzeriana*, which grows in the form of a low broad pyramid, is the most satisfactory of all Junipers in this climate. Fortunately it can now be found in most American nurseries. There are dwarf round-topped forms of *J. chinensis* with green and with yellow leaves which are less than a foot high; and a form of this Juniper, var. *Sargentii*, from northern Japan with prostrate stems makes mats now eight or ten feet across here. This is a form reproducing itself from seed and has proved to be one of the best of the mat-like Junipers in the collection. With the exception of the dwarf form of the European *J. sabina* (var. *minor*), the lowest Juniper in the collection is *J. horizontalis* which has long prostrate stems with blue-green or in some forms steel blue leaves. This is a North American plant which is widely distributed from the coast of Massachusetts to British Columbia. There are fine masses of this plant in the collection. Less well known is *J. conferta*, another species which covers with long prostrate stems the sand dunes on the coast of Japan. Raised first in the Arboretum three years ago from seeds collected by Wilson in northern Japan there is every reason to believe that this will prove a useful plant in this country. Another prostrate Japanese Juniper, *J. procumbens*, is better known. It is distinguished by its sharply pointed leaves marked on the upper surface by two white lines. This Juniper has not produced seeds and is not known except as a cultivated plant; it is planted, however, in nearly every Japanese garden and has been much planted in California and occasionally in the eastern states. A dwarf Juniper, *J. communis* var. *depressa*, covers thousands of acres of hillsides in the northeastern states where many forms occur differing in the height and in the width of the leaves. These are coarser and less desirable garden plants than *J. horizontalis* and the different low-growing varieties of *J. chinensis* and *J. virginiana*.

These Bulletins will now be discontinued until next spring.



